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THE VETERINARY JOURNAL

A Monthly Review of Veterinary Science.

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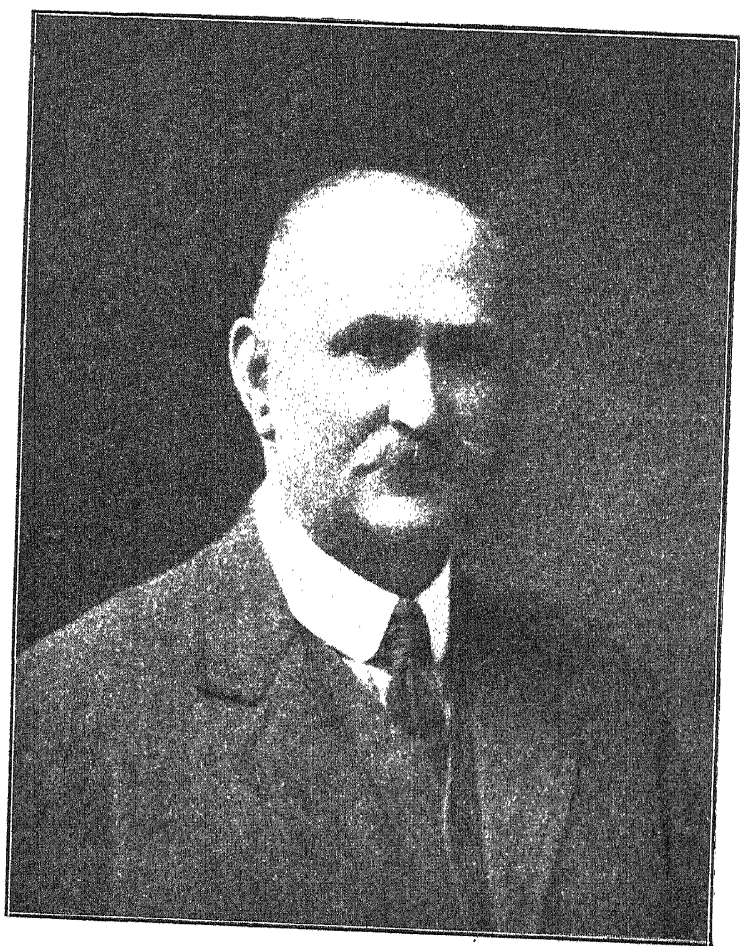
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THE LATE MR. JOHN A. THOMPSON, J.P., F.R.C.V.S.

THE VETERINARY JOURNAL

JANUARY, 1914.

THE LATE MR. J. A. THOMPSON, J.P., F.R.C.V.S.

FEW practitioners were better known or more popular in the North of Ireland than the late Mr. Thompson, and his death at the age of 56 has come as a surprise and shock to his numerous friends.

A popular practitioner, he qualified from the Dick Veterinary College in 1881, settling down in Lurgan in 1883, where he soon built up a very large private and consulting practice; in 1890 he gained the Fellowship Degree. His opinion was much respected by his brother practitioners, with whom he was on the best of terms, and his judgment was accepted as the final word by a very large *clientèle*.

In public life he occupied many positions of prominence, taking a large share in the management of the affairs of the town of Lurgan and in several associations connected with agriculture and horse breeding. In 1909 Mr. Thompson was made a Justice of the Peace, a position of honour which he occupied at the time of his death. His place, both in the profession and in his native town, will be hard to fill, and his death is one which is much regretted by a very large circle of friends and sincere admirers.

Editorial.

AN ASSISTANTSHIP AGREEMENT.

A CASE which carries with it a great deal of importance and interest to the members of our profession, as well as to those who practise other branches of medicine, has just been decided in the Court of Appeal, the facts briefly being as follows:—

The plaintiff, a medical man, specialized in certain laboratory work and employed another medical graduate as assistant,

requiring him to sign a bond not to engage in similar work either on his own account or on behalf of any other institution of a like character within a radius of ten miles, under a penalty of £250.

His assistant, after leaving his service, opened a similar laboratory on his own account at an address in close proximity, and the action was brought to prevent this.

At the first trial the judge held that the restriction in the agreement of service only endured during the period of service and entered judgment for the defendant. At the appeal the Master of the Rolls held that the restriction imposed by the agreement was not limited to the term of the engagement but endured for the whole of the defendant's life; but he expressed the view that the restraint imposed by the agreement *went beyond what was reasonably necessary for the plaintiff's protection*. He thought, therefore, that the plaintiff was not entitled to the injunction he claimed and that the appeal failed. Lord Justice Swinfen Eady differed, being of opinion that the restraint imposed by the agreement did not go beyond what was reasonably necessary for the plaintiff's protection, but Lord Justice Phillimore agreed with the judgment of the Master of the Rolls, and the appeal was dismissed with costs.

The words in italics are ours, for it is in them that the gist of the whole matter lies, and the point for an employer to bear in mind and to be rightly advised about is "what is reasonably necessary for one's own protection."

As a rule, in veterinary practice it is usual for an employer to bind his assistant off from practising within a radius of ten miles in the country or four miles in a large town—and such has been held to be fair and reasonable, as we have to go much further afield and cover a much larger area than our medical colleagues in order to earn a living; but if too large an area is allotted and signed for, the agreement can be set aside, and it is well for the fact to be well known.

As to whether it is professionally dishonourable or not to break one's word when it has been so deliberately given as to be actually put in writing is another matter. Most men would think so, but here and there one finds exceptions to the rule, and in order to guard against such contingencies it is necessary that the employer should protect himself by every legal means within his power; and in order to do this he should endeavour to employ

a lawyer who knows his business. To endeavour to do it in amateur fashion or with inexperienced help would be to court disaster, and it is on points such as this case in question, where even the judges themselves differed, that the law affords some of its greatest surprises.

SHOULD LADIES BECOME VETERINARY SURGEONS?

A LETTER on the above subject, recently addressed to the Council of the Royal College of Veterinary Surgeons, together with a case brought before the Court of Appeal as to the right of women to practise at the Bar, has reopened the question of the rights of women to practise in these two professions in the same way as in the practice of medicine. Some years ago a lady demanded the right to sit for the Examinations for the Diploma of the Royal College of Veterinary Surgeons and, as it was unchivalrously refused, took the case to Court, but was defeated temporarily on certain technical points not at all connected with the main question at issue. Since then the matter, as far as the veterinary profession is concerned, has been dropped, and although inquiries have from time to time been made the matter has never been fought out to a real finish. As to whether the profession is, or is not, suited to members of the gentler sex is a matter of opinion, although there is no question as to the great possibilities for them in canine work, and the lady who can successfully qualify and establish herself in some large town has an excellent future to look forward to. For the larger animals the question of physique must be taken into consideration, as the life of a country practitioner involves frequent and prolonged exposure to the weather and the handling of heavy and sometimes rough animals.

The legal aspect as regards the permission to sit for examination is, however, the first essential, as without it the Diploma is unattainable, and the recent decision given against the lady aspirant for legal honours will tell heavily in any future case of a similar nature brought against the Royal College of Veterinary Surgeons.

Briefly, the decision was that the practice of the law was a very ancient one, and that ever since attorneys as a profession have existed women have never been admitted to the office; for

this reason it was held that the applicant was not entitled to insist upon being examined by the Law Society with a view to entering the profession.

FOOT-AND-MOUTH DISEASE.

THE recently reported recrudescence of foot-and-mouth disease in England will make the abstract on p. 6, taken by permission from the official Report of the Department of Agriculture for Ireland, of more than usual interest, for apparently the country practitioners and port inspectors must for some time to come be on the alert. The full report consists of some seventy-four pages with twenty-four illustrations, and enters very fully into details, and it is with the object of drawing attention to the clearness of these that our abstract is made. Especially do we commend it to the younger generation of practitioners whose opportunities have not occurred to see actual cases, for the differences of opinion in diagnosis which were made during the 1912 Irish outbreak, even by experienced practitioners, illustrate full well that the disease may readily be mistaken with certain other conditions of the mouth and tongue frequently met with in certain districts of Great Britain.

LITERARY NOTE.

WE are informed that the copyright of that unique and beautifully illustrated work on the "Surgical Anatomy of the Horse," by Mr. J. T. Share-Jones, M.Sc., F.R.C.V.S., Lecturer on Veterinary Anatomy at the Liverpool University, has been acquired by Messrs. Baillière, Tindall and Cox from Messrs. Williams and Norgate.

The three volumes already issued can now be obtained from them, and volume iv, which concludes the work, is in preparation for publication in the spring. It will be replete with illustrations, both plain and coloured, and will treat of the foot, throat and back, abdomen and loins, the urinogenital organs, heart and blood-vessels, and the muscles of the trunk.

For further particulars see advertisement on p. ix.

General Articles.

THE GREAT VALUE OF IODINE AS AN ANTISEPTIC FOR THE SKIN IN THE SURGERY OF ANIMALS.

By FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.

Kensington, W.

IODINE in various forms, especially as the tincture or the liquor, has been used for generations by the old farmers and also by the modern veterinarian, but principally as a wound lotion diluted with water. Its chief objection has been that it has stained the hands of the dresser.

About ten years ago its use was revived in a somewhat different manner for external application to the unbroken skin, its value in this being especially pointed out for human surgery. It was shown quite conclusively, after numerous experiments, that if either the tincture of iodine or iodized chloroform were merely painted over the unbroken skin and allowed to dry, the skin became practically germ-free for the time being, and also that this effect was much more marked when the skin had not been previously scrubbed and washed; the reason for this being that the irritation and cleansing produced by the scrubbing caused the dermal cells to swell, and so be in a condition in which the iodine penetrated much less readily.

In animal surgery the use of iodine has not been practised as extensively as it should have been and its use ought to become more general, for its effects, if used properly, are simply marvellous.

In a busy surgical practice during the past four years, in operations which have included a very large number of such important abdominal operations as removal of retained testicles, ovariectomy and ovaro-hysterectomy, the following practice has been adopted with equally admirable success in large horse patients as in the dog and cat.

The hair has been removed with a sharp razor by dry shaving, no washing or scrubbing being done, and the parts painted either with plain tincture of iodine or iodized chloroform (generally the former) about ten minutes before the skin was incised—just sufficient time being allowed for the iodine to dry on the surface of the skin. When the operation was completed and the sutures

were united the parts were again painted, and this was done twice a day (or, in some cases, only once), the sutures being ready for removal and the wound cicatrized about the sixth or eighth day. In scarcely any instance was a bandage applied, nor was it necessary, as it was most rare for a dog to attempt to lick at the sutures, thus proving that if a wound is aseptic there is no irritation.

The use of iodine in this way can be safely and emphatically recommended in veterinary patients where surgical measures are necessary.

A REPORT ON FOOT-AND-MOUTH DISEASE IN
IRELAND IN 1912 TO THE DEPARTMENT OF
AGRICULTURE AND TECHNICAL INSTRUCTION
FOR IRELAND.

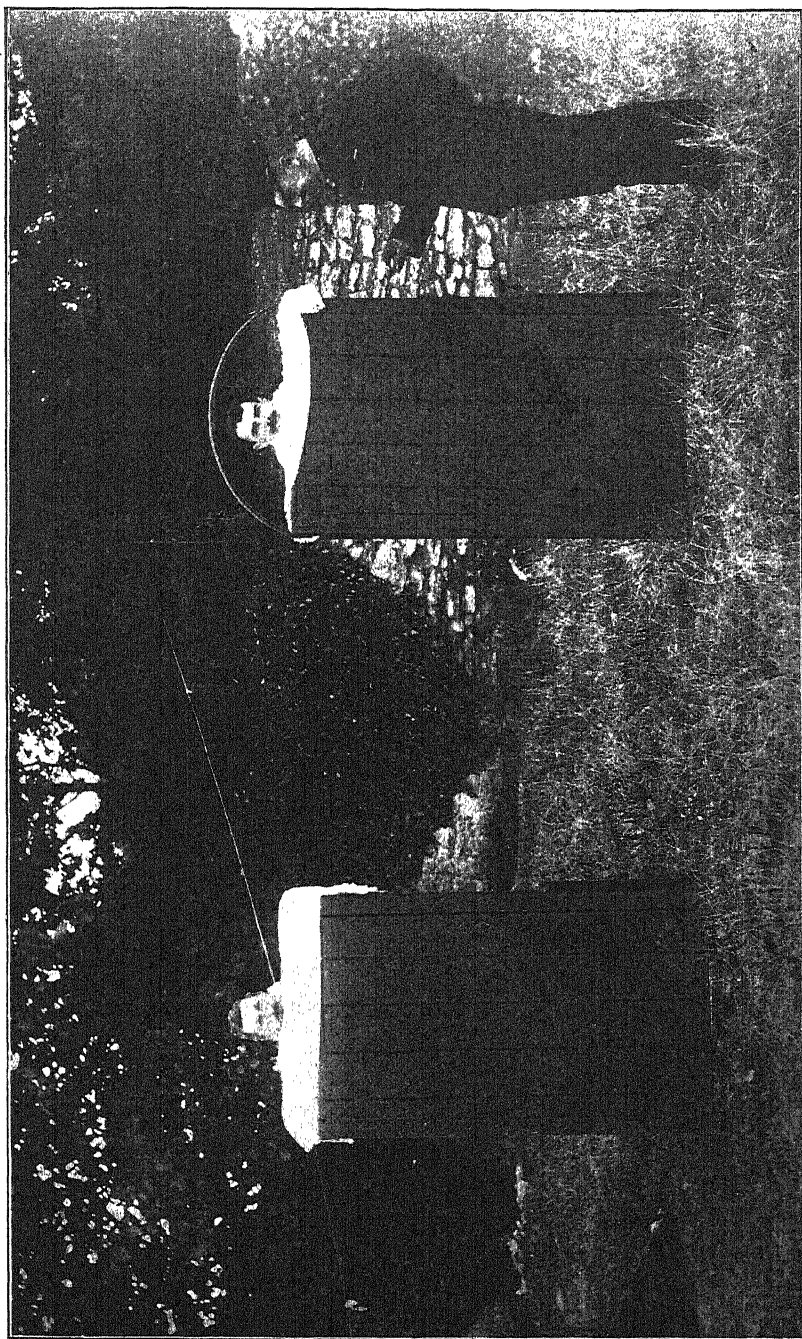
(Abstracted.)

IRELAND'S LONG IMMUNITY.

UNTIL the end of June, 1912, Ireland had been wholly free from foot-and-mouth disease for more than twenty-eight years. During all that time of immunity in Ireland the disease had raged on the Continent, and recurrent attacks had occurred in Great Britain.

On all occasions of outbreaks in Great Britain measures of precaution were taken to prevent the introduction of the disease into Ireland. These measures included the stoppage for the time being of the importation into this country from Great Britain of cattle, sheep, goats and other ruminating animals, and swine, the disinfection on arrival in Ireland of dealers and drovers coming from British markets, and, in recent years, the temporary prohibition of the landing of hay and straw for use as litter or fodder for animals. The success of this precautionary action is attested by the fact that in none of these cases, though of frequent happening, was the infection carried into Ireland.

It should be mentioned that some animals had been under treatment since June 15 by a local "cow-doctor," who is not a veterinary surgeon, and who had been called in by the herd. This man had mistakenly treated the animals for an affection commonly known as "timber-tongue."



Disinfecting—the sulphur bath.

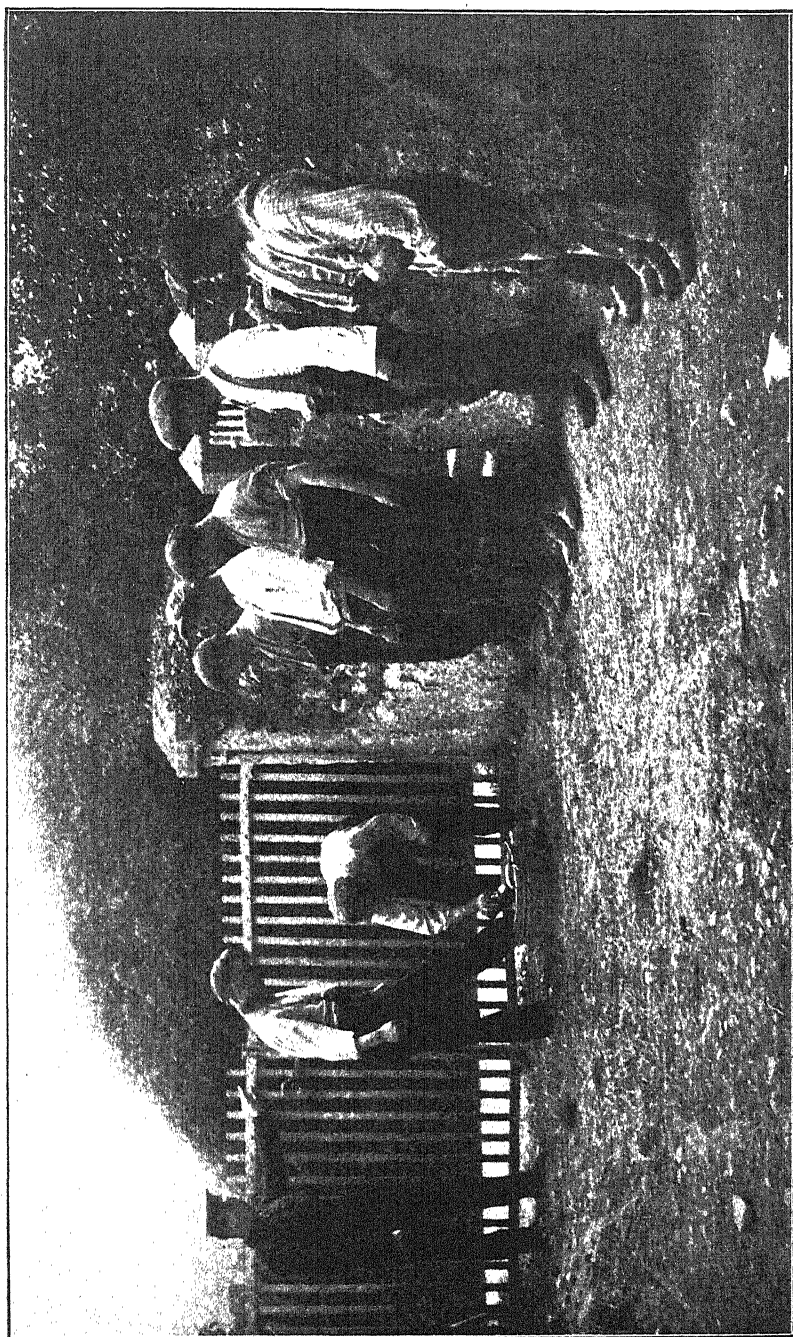
Measures were taken immediately to guard against the spread of the disease from the infected locality. The assistance of the Royal Irish Constabulary was sought, and was freely accorded by the Inspector-General, with the concurrence of the Under Secretary to the Lord Lieutenant. A rigid guard of police was maintained round the farm on which the outbreak occurred, with the object of preventing all movements of persons or animals which would be likely to spread infection, and this farm was, by an Order of the Department, declared an "infected place" and made subject to the restrictions (to be described later) which apply to such places. In consequence of this outbreak fifty-four diseased cattle in all were slaughtered, and seventy-six cattle and two pigs were also slaughtered, not as being diseased, but as having been in contact with diseased animals, and thereby exposed to infection.

The steamship *Slieve Bloom*, on which the diseased animals had travelled, was thoroughly disinfected with carbolic acid and repainted.

Immediately on the occurrence of the first outbreak the Department despatched to Swords all the available members of their staff of veterinary inspectors. At the same time the entire staff of the veterinary branch, wherever stationed, were notified that they might be required immediately to take up duty in connection with foot-and-mouth disease, and all officers on leave of absence were recalled. The staff was strengthened by the temporary employment of additional veterinary surgeons. The number of extra temporary inspectors eventually reached thirty.

FURTHER OUTBREAKS AT SWORDS.

On July 1 two further outbreaks were confirmed on the demesne situated at Miltonfields, Swords, close to the scene of the first outbreak. On July 2, 4, and 5 five further outbreaks occurred in the same vicinity. Between July 8 and July 22 eight outbreaks took place, and another (the final outbreak in the district) occurred on August 14. The total number of outbreaks in the Swords district was, therefore, seventeen. The number of animals found diseased on the several farms at Swords where foot-and-mouth disease occurred was 208 cattle and one sheep. The total number of animals slaughtered—including those diseased and those exposed to infection—was 1,006 cattle, 881 sheep, 26 swine, and 15 goats.



Labourers disinfecting boots.

On July 18 the restrictions on all movements of cattle, sheep, goats and swine, applying to Dublin and the adjoining counties, were modified so as to exclude Counties Wicklow and Kildare and the parts of County Meath lying to the north and west of the railway lines from Drogheda to Navan and from Navan to Kilcock.

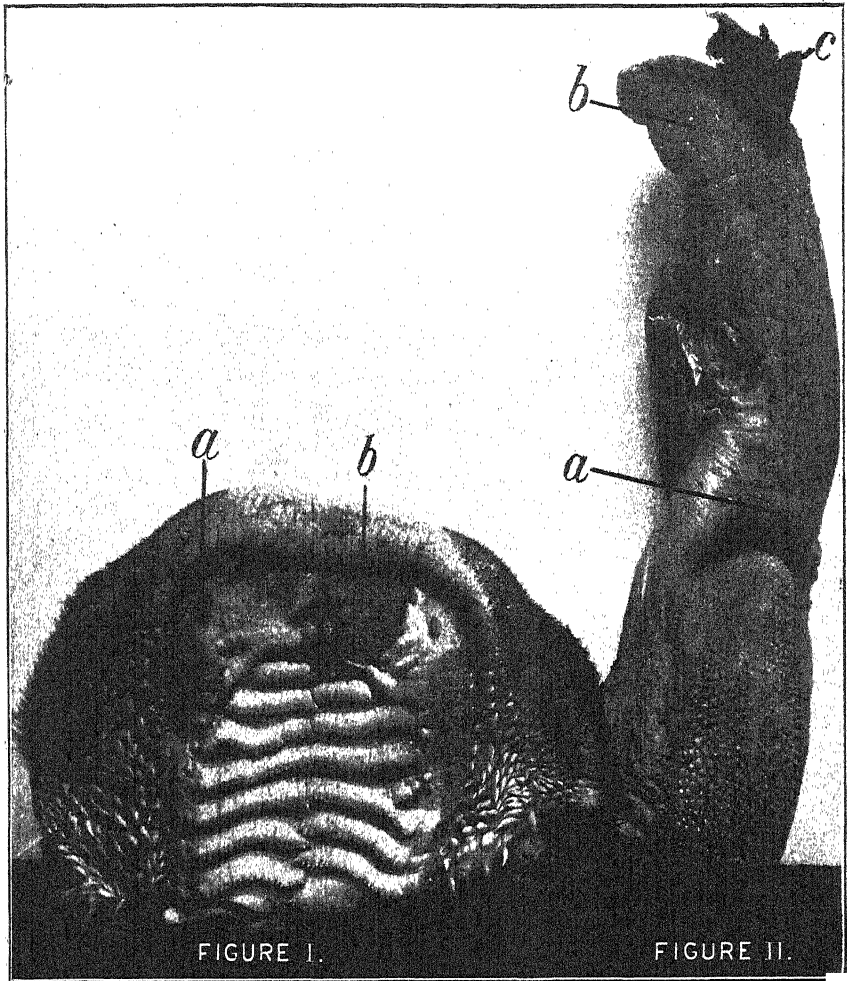
As an additional measure of security the Department prohibited by Order the movement of hay or straw out of, or within, five electoral divisions at and around Swords.

THE SCHEDULED DISTRICTS.

As soon as the existence of foot-and-mouth disease at Swords was definitely known, the Department, as already mentioned, issued an Order which created a large scheduled district, comprising the City and County of Dublin and the bordering Counties of Meath, Kildare, and Wicklow. "Stand-still" restrictions were imposed on this scheduled district. The Order forbade the movement of any cattle, sheep, goats or swine into the district or out of it. It also prohibited the movement of any cattle, sheep, goats or swine, along, over, or across, any highway or thoroughfare within the scheduled district, or their being allowed by the owner or person in charge of them to stray upon a highway or thoroughfare within the district. This drastic prohibition formed a very effective embargo on all movements of animals which would be likely to spread the disease.

The Department, however, in scheduling such districts reserved to themselves, by a provision in their Orders, the right to permit exceptions to the general prohibition in special cases. Licences for movements prohibited by the Orders were granted by the Department in exceptional cases of undoubted necessity, and when the Department were satisfied that no danger of conveying infection would arise from the movements. No animals were in any circumstances licensed to be moved into, from, or within, a scheduled district, except after careful veterinary inspection, and the movements were in nearly all instances conducted under police supervision. The number of animals allowed to be moved in this fashion was, of course, comparatively very small.

When, after a short period, the scheduled district comprising the four counties mentioned was reduced somewhat in extent, the



Dental pad and portion of palate of cow with foot-and-mouth disease. *a*, small ruptured vesicle; *b*, erosion of mucous membrane, following rupture of vesicle.
Tongue of cow with foot-and-mouth disease. *a*, unruptured vesicle; *b*, large ruptured vesicle; *c*, portion of epithelium still adhering after rupture of vesicle. (Group No. 1.)

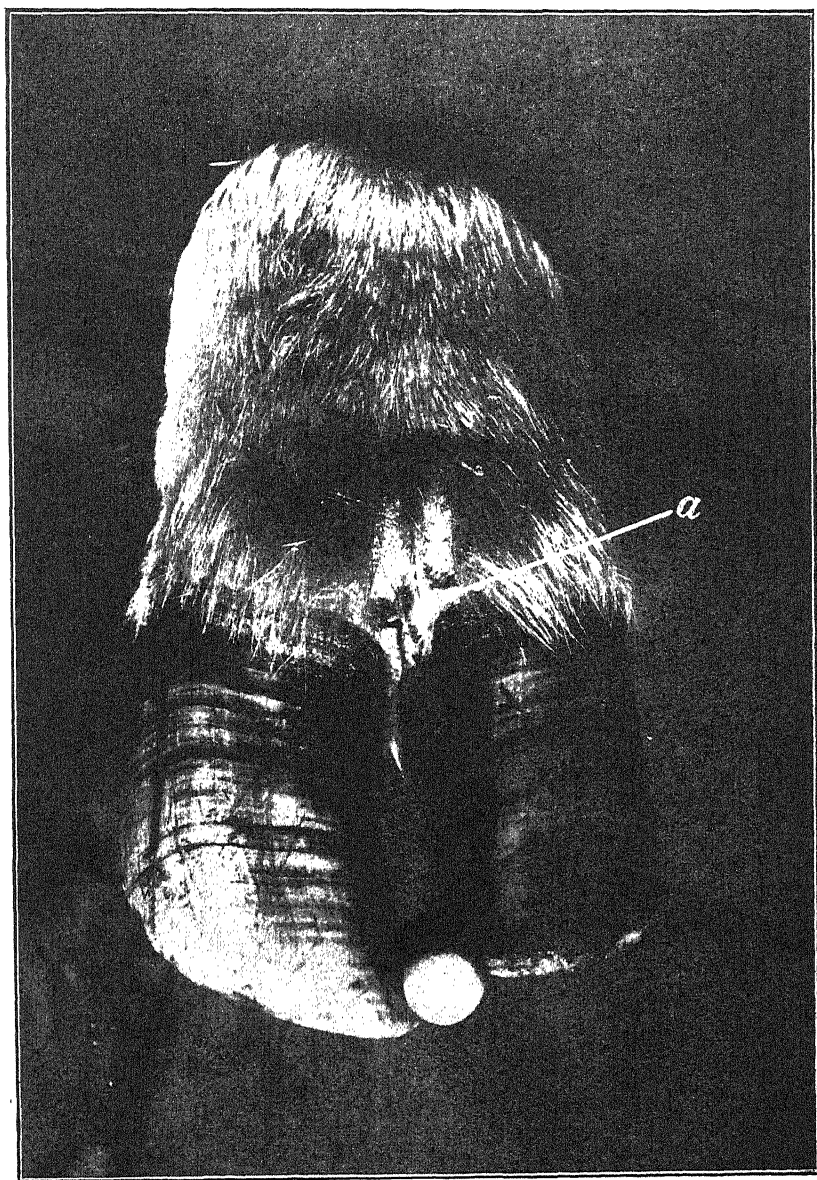
Department, as an additional precautionary proceeding, prohibited the slaughter of animals and the movement of carcasses within the district, unless a licence for the slaughter or movement had been granted by an inspector or other officer authorized by the Department for the purpose. But this particular prohibition was not enforced in connection with the majority of the subsequent outbreaks of the disease which occurred in other parts of the country.

The Fifteen Miles Radius of Scheduled Districts.

In the cases of the later outbreaks also the scheduled districts were of smaller proportions than at first. The extent of country—four counties—scheduled on the occurrence of the first outbreak at Swords was unusually large. The Department at that time had strong hopes that the disease might be confined within the Swords area, and they accordingly did not hesitate to proclaim a very extensive district, so as to shut off the affected locality as completely as possible from the rest of Ireland. But it became evident once the disease had ceased to be confined to a single district and become sporadic, that it would not be practicable to maintain so large areas under restriction. In nearly all the later cases, accordingly, districts having a radius of about fifteen miles from the seats of disease were scheduled. The radius of fifteen miles, it may be mentioned, is that fixed by the British Board of Agriculture in the first instance on the occurrence of an outbreak in Great Britain.

The Hay and Straw Movement Prohibited Areas.

The first of these were the prohibited areas as regards which not only movements of animals, but movements of hay and straw, were debarred by the Order of the Department. The Department's Orders dealing with these areas required that no hay or straw should be moved out of the areas, or be moved along, over, or across a highway or thoroughfare within the areas, except when a licence for such movement had been granted by an inspector of the Department or other authorized officer. The prohibited area in the Swords district embraced a wide region, covering five electoral divisions. But in other cases the areas generally extended only from about three to five miles from the infected farms or premises. These areas were kept under specially rigid supervision by the Department's inspectors and



Foot of cow with foot-and-mouth disease. *a*, ruptured vesicle at inter-digital space.
(Group No. 1.)

the police. And when, in process of time, the favourable course of events rendered practicable the removal of restrictions from the major part of the scheduled district, the prohibited areas were excepted, and continued under movement restrictions for some weeks longer.

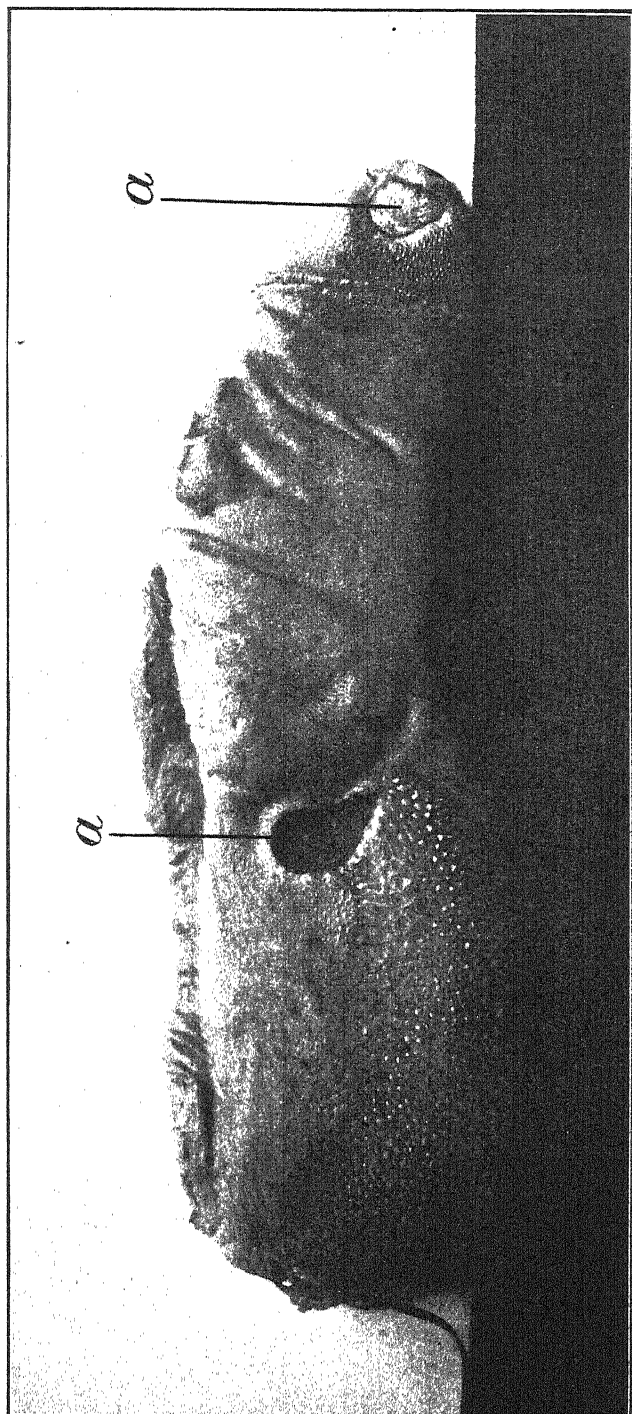
The Infected Places.

The innermost areas, which were subject to the severest restrictions of all, were the infected places.

On the confirmation of an outbreak of foot-and-mouth disease, the premises or lands on which the outbreak had taken place were immediately, by order of the Department, declared to be an "infected place." The regulations which apply to an infected place are very stringent. No animal may be moved into or out of the infected place, unless a licence for the movement be granted by an inspector of the Department or other authorized officer. The carcasses of animals may not be removed from the infected place without written permission of an inspector or other authorized officer, and likewise, fodder, litter, dung, utensils, pens, hurdles, &c., may not be taken from the place without such permission, which is not in any case granted until the things to be moved have been thoroughly disinfected. No person (except the person tending the animal) is allowed, unless specially authorized, to enter any shed, field, or other part of an infected place in which a diseased or suspected animal is or has recently been kept; and any person permitted to enter any such field, shed, or other place, must, upon leaving it, thoroughly wash his hands with soap and water and disinfect his boots and clothes. A person tending a diseased or suspected animal is prohibited, except with special permission, from tending any other animal which is not diseased or suspected.

The Police Cordon.

As already mentioned, the necessary protective and precautionary measures were carried out through the agency of the Royal Irish Constabulary. A body of police—a *cordon sanitaire*—in constant touch with each other, and for the most part provided with bicycles, kept close and incessant guard round the neighbourhood of the infected places. So strict was the watch kept by the police that an observer of their patrol could not fail to recognize how difficult it would be for any unauthorized



Tongue of cow with foot-and-mouth disease. α and α , erosions of mucous membrane after rupture of vesicles. (Group No. 2.)

person or any animals to pass into or out of the forbidden area without instant detection.

The House-to-House Inspection.

A number of the veterinary inspectors who had proceeded to Swords promptly began a diligent house-to-house and farm-to-farm inspection of all animals in the vicinity. This was carried out most thoroughly, the area of inspection being daily widened, and it resulted in the discovery by the inspectors of cases of foot-and-mouth disease on several farms in the district.

This form of local inspection was carried through at all places where foot-and-mouth disease broke out. All animals inspected were carefully "mouthed" (*i.e.*, their tongues, palates, and lips were critically examined for symptoms of the disease) and a record was made of the numbers and kinds of animals on the various farms, in view of the possibility of surreptitious movements. The staff of inspectors engaged on this work was quite distinct from the staff on duty in the infected places.

The Slaughter of Diseased Animals.

The slaughter and burial of diseased and in-contact animals was conducted on the lines now to be described, and entailed a large amount of labour and expense. Butchers were specially employed for slaughter purposes, and a gang of labourers for the digging of pits and burial of carcasses. The method of slaughter employed in the case of cattle was shooting. Sheep and pigs were killed in the usual manner. The carcasses were covered with lime, and deeply buried in large pits which were dug at suitable places. Quicklime was scattered on the surface of, and around, these pits. Portions of the carcasses of quite healthy cattle and sheep were, however, sold to meat dealers. But the hides of all animals were invariably buried, in view of the possibility of their carrying infection, even though the animals might themselves show no signs of disease. No attempt was made at Swords to salvage pigs, as only a small proportion were really good fat animals, and facilities for scalding, &c., were not available. When animals were slaughtered in connection with outbreaks which occurred at other places later on, it was found possible to salvage all the carcasses except those actually diseased. In all cases the owners of slaughtered cattle were awarded fair compensation for their beasts, on the valuation of a competent valuer.

Disinfection of Infected Places.

All practicable and necessary steps were taken for the disinfection of premises and lands on which disease had broken out, and no measure that experience or care could suggest for providing against a recurrence or extension of the disease in the district was left unaccomplished. Farmyards, and all such places on which diseased animals had been, were thoroughly disinfected with Jeyes' Fluid. The same disinfectant was freely used in byres, sheds, &c., and these were, in addition, fumigated by burning sulphur. Limewash was then applied to all parts of them, and all litter, dung, &c., remaining in such places was mixed with quicklime. The fields in which the animals had grazed were carefully strewn by machines with newly burned lime.

Disinfection of Hay by Super-heated Steam.

Stacked hay is obviously a very probable place of lodgment for disease germs, and all stacks of hay on farms near the scenes of outbreaks at Swords were disinfected by the agency of super-heated steam. This method of disinfection which, so far as the Department are aware, had not been previously used in Ireland, proved very effective. Steam was injected from an engine into the ricks to a depth of $1\frac{1}{2}$ to 2 ft. The heat penetrated to a distance of over 3 ft. Repeated tests with a thermometer showed a temperature of 220° F. The process did not damage the hay in any way for marketing purposes. On examination on the day after steaming the hay was found to be quite dry, and the only evidence of the treatment was that the outside of the ricks showed a brownish appearance as if the hay had been boiled.

Disinfection of Persons.

All persons who had any dealings with diseased animals, or were required or allowed to enter infected places, were carefully disinfected before leaving. The Department's inspectors and the police and labourers never came away from these places without disinfection by sulphur or Jeyes' Fluid. Disinfecting boxes of a suitable kind, in which sulphur candles were burned, were specially provided. High rubber boots and overalls, which could easily be washed with disinfecting fluid, were worn by the inspectors, butchers, and others when on duty. In cases of vehicles leaving the infected places, the wheels of the vehicles and the horses' feet were washed with Jeyes' Fluid. Tools used in slaughter were

disinfected, and tins containing a strong solution of Jeyes' Fluid were placed about in fields where any operations were being conducted, so that all persons who had authority to enter these fields could readily disinfect their hands, clothing, boots, &c. The butchers were supplied with extra suits of clothes, so that they should not leave the infected places in the same clothes in which they had been working.

So long as foot-and-mouth disease existed in Ireland or in Great Britain, the Department kept in operation very thorough arrangements for the disinfection of persons landing in Ireland who had been in contact with animals on board ship in transit to or from Great Britain or in any part of Great Britain. At all the Irish ports such persons were required on arrival to disinfect themselves and their clothes. Materials were provided for this purpose, and a staff detailed to look after the matter.

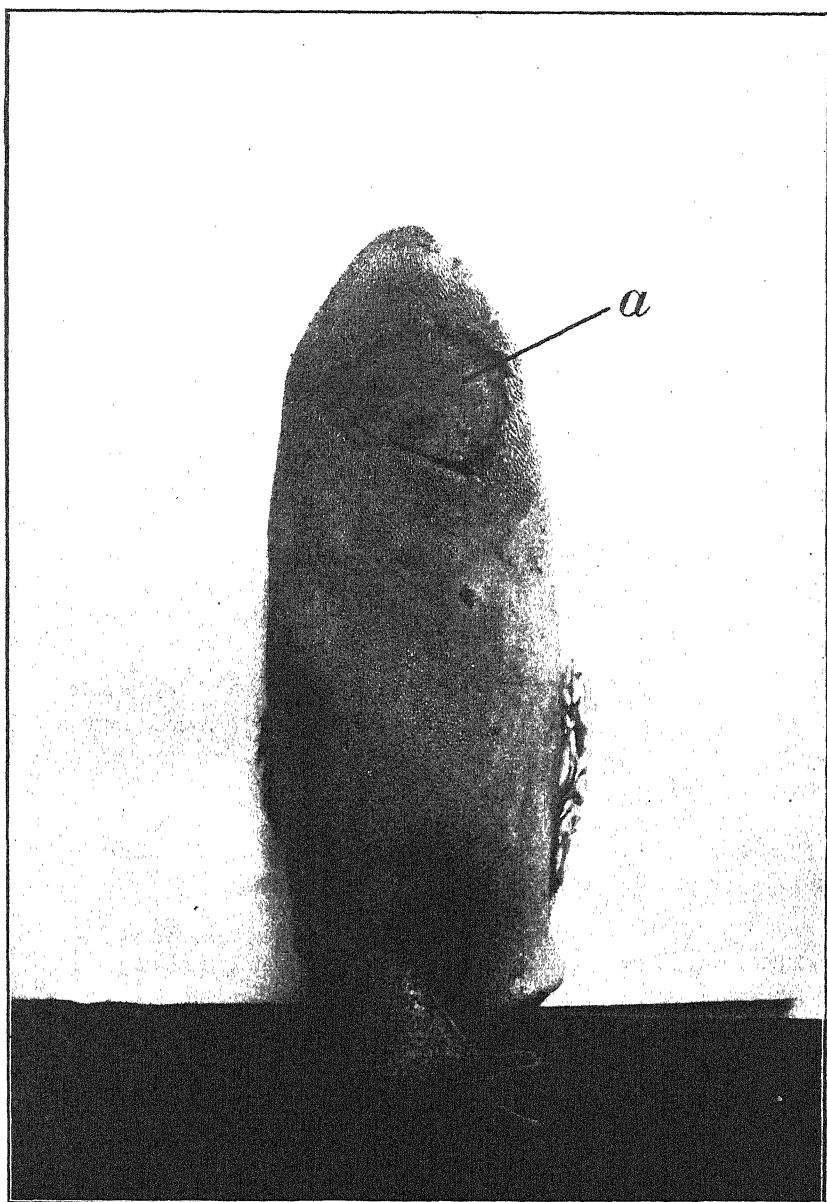
Poisoning of Foxes, &c., at Swords.

It appeared to the Department that foxes in the neighbourhood of Swords might be a probable means of carrying the disease, and consequently poison was laid with the object of destroying these foxes. For the same reason persons residing on or near infected places were required to confine their dogs.

EFFORTS TO DISCOVER ORIGIN OF DISEASE AT SWORDS.

The Department made all practicable efforts to discover the origin of the disease at Swords. It is true that an outbreak had occurred at Penrith, in Cumberland, on June 24—some days previous to the Swords outbreak—and it is possible that the infection may have been conveyed to Swords by drovers, dealers, or others returning to the district from the North of England. But no definite evidence to establish this connection was forthcoming.

The possibility of hay and other feeding material and straw being a source of the infection was particularly investigated. It was stated that a diseased cow belonging to a Mrs. Weldon, who lives near Swords, had been bedded in straw which had been imported into Ireland as packing material, but on inquiry it was found that Mrs. Weldon's cow was visibly affected with the disease before being brought into contact with the foreign straw. It was further reported that manure from the Army Remount



Part of tongue of bullock with foot-and-mouth disease. *a*, erosion of mucous membrane, following rupture of vesicle. (Group No. 3)

Depôt at Lusk had been conveyed to Swords, and that foreign fodder or litter had been used at that Depôt. But the officers at the Depôt assured the Department's inspectors that no foreign fodder or litter was used there, such material being obtained from the local farmers, and it was also found on inquiry that no manure from the Depôt had been brought to Swords. The matter of the movements of men as a probable means of carrying infection was also looked into, but with a negative result. The Department were further informed that foreign hares had been procured and liberated in the vicinity of Swords, but inquiries disclosed the fact that these were not foreign hares, but had come from County Longford.

Many other and varied suggestions as to the cause or origin of the disease were proffered almost daily, in communications to the Department and to the newspapers. Mice, birds, mushrooms, bulbs from abroad, foxes and sundry other animals and things were suggested. All suggestions and suppositions which seemed to the Department to indicate probable sources of the disease were closely investigated, but no clue to its origin was discovered, and this matter remains, and apparently must always remain, a mystery.

Numerous alleged cures for the disease were also propounded, but as no cure which would remove infection or render animals immune is yet known to veterinary science, these suggestions were not very useful.

PACKING MATERIAL AS A POSSIBLE MEANS OF SPREADING DISEASE: DEPARTMENT'S WARNING.

The risk of foot-and-mouth disease being spread by hay and straw used for the packing of imported goods, coming from foreign countries where the disease is prevalent, was one to which the Department considered it important specially to direct the attention of the public. This question had been under the consideration of the Departmental Committee appointed by the President of the Board of Agriculture and Fisheries to inquire into foot-and-mouth disease in Great Britain. In their report, issued last year, the Committee pointed out that numerous imported articles are packed in hay or straw, and that a large proportion of this packing ultimately reaches farms as manure. The Committee considered that this packing constitutes a source

of danger, but in view of the serious dislocation of general trade which the prohibition of its use would entail, they were not prepared, without further evidence, to advise that course. They recommended, however, that persons using such hay and straw should be warned of the element of danger which it contains, and of the risk of allowing it to come into contact with any animals. They also advised that, where possible, it should be burned.

CASES OF FOOT-AND-MOUTH DISEASE IN ENGLAND ATTRIBUTED TO
IRISH ORIGIN.

During the course of the Irish outbreaks in July and August the Department received from the Board of Agriculture and Fisheries several reports of cases of foot-and-mouth disease at places in England, which were said to have occurred amongst cattle shipped from Ireland. These cases were exhaustively investigated by the Department, but no evidence was forthcoming in connection with any of them to indicate that the animals were suffering from foot-and-mouth disease at the time of export from Ireland, nor was any trace of the disease found at any of the farms from which they came, or amongst animals which had been in contact with them.

SPECIAL MOVEMENTS ON LICENCE FOR BREEDING PURPOSES, &c.

During the months of September and October the Department arranged extensively for permitting movements of animals on licence to Counties Dublin, Kildare, Meath and Louth for breeding purposes, and for the movement of animals to bacon factories, and of milch cows to pastures or dairy yards within certain parts of the scheduled areas. Steps in this direction had become requisite for the relief of stock-owners, breeders, and dairymen living within those areas who were suffering heavy losses through the foot-and-mouth disease restrictions. The Department, therefore, arranged for the attendance of veterinary inspectors at sundry fairs in Central, Southern and Western Ireland, with the object of their issuing licences for these movements. Large numbers of animals were moved from the fairs (which included the great October fair at Ballinasloe) after veterinary inspection. Animals were not, of course, allowed to be brought to localities near infected places.

THE NEWRY-BIRKENHEAD CASES.

On December 4 news was received from the British Board that their veterinary inspector in charge at Birkenhead had that day discovered a case of foot-and-mouth disease amongst a consignment of Irish cattle landed at that port from Newry, and that the Board had in consequence entirely prohibited the landing of animals in Great Britain from any port in Ireland pending investigations.

On the following day the Board reported that on completion of the inspection of the cargo at Birkenhead four additional cattle had been found affected with the disease. Immediate inquiries as to the places of origin of the animals concerned were undertaken by the Department. The cargo had been shipped from Newry on the s.s. *Iveagh*, and had consisted of 73 cattle, 143 sheep, and 525 swine. No disease was discovered in the sheep or swine. The places that the 73 cattle came from were ascertained without delay. They were situated in Counties Armagh, Tyrone, Monaghan, and Down. A thorough examination (including, of course, "mouthing") of all the animals which could have come in contact with the seventy-three which were exported was made, without discovering any case of foot-and-mouth disease.

At the request of the Department the Board of Agriculture and Fisheries forwarded to Dublin the tongue and lips of the first bullock detected, as well as the lips of the remaining four cattle said to be affected. These were examined by four of the Department's inspectors, all of whom are veterinary surgeons of considerable experience, and these officers reported that they failed to find any lesions on them which they would consider to be those of foot-and-mouth disease. The tongues showed elevations and peeling off of the surface epithelium, but these were not, in the opinion of the four veterinarians who examined them, of the character met with in foot-and-mouth disease.

The Question of Portal Inspection at Newry.

In connection with this shipment people naturally asked how it came about that animals with disease marks on the tongues passed the Portal Inspector at Newry. Questions were addressed to the Vice-President in the House of Commons on the subject, which pointed to the fact of the suspicious case at Dublin port having been detected, while these were not noticed. The matter

is easily explained. The animals shipped from Newry were fat cattle, and in accordance with the arrangements which had been made with the Board of Agriculture and Fisheries, it was not then the practice to "mouth" fat cattle, which were intended for slaughter immediately after arrival at the foreign animals wharves. "Mouthing" was confined to store cattle, which would be moved, after a period of quarantine, to other places in Great Britain. The animals detected at Dublin were stores, and the suspicious appearances on their tongues were discovered during "mouthing." The fat cattle shipped at Newry were under the observation of the Portal Inspector—a veterinary surgeon of twenty-eight years' experience—for more than three hours, but none of them exhibited any external symptoms of disease.

THE "PEELING-TONGUE" CASES AT ARMAGH.

In the process of inspecting the animals on farms from which the cargo shipped from Newry came it was found that four out of seven cattle on a farm at Luggyvallen, near Armagh, showed a peeling off of the surface epithelium of the mouth of the same kind as that observed on the tongues and lips of the cattle detected at Birkenhead. It was from this particular farm at Luggyvallen that one of the cattle found diseased at Birkenhead came. These animals were examined by five veterinary inspectors and by Professor Mettam. At the time of inspection six of the seven cattle were affected in the manner described. There were brown-coloured markings on the tongues, and a thin layer of surface epithelium was peeling off in patches from the tongues, and in some cases also from the lips, without, however, exposing the corium in any place. No vesicles appeared, and no soreness of the tongues or other parts of the mouths. The affection could not be observed without opening the animals' mouths. There were no feet lesions. Constitutionally the cattle showed no change from their normal and natural state, and they did not seem to be inconvenienced in any way by this ailment. It was agreed by all the veterinary surgeons who examined them that these cattle were not subjects of foot-and-mouth disease. A similar condition of the mouths was found in two cattle on a farm near Loughgall, County Armagh, which was also the place of origin of one of the affected animals sent to Birkenhead.

(To be continued.)

CEDEMA OF THE WATTLES OF FOWLS DUE TO AN ORGANISM OF THE PASTEURELLA GROUP.

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THE following paper gives an account of an investigation made in reference to the cause of a condition affecting the wattles of fowls, and, as will be seen from the results of this work, there is reason to believe that it is due to a pasteurella, and further, is probably but a form of chicken cholera.

This latter disease, as one knows, is fairly common in certain parts of Australia and New Zealand, and causes a greater or lesser mortality in nearly every poultry yard at some time or other.

Although all the cases under review were all obtained from one property, this form of disease has also been noted on other properties near Melbourne, but unfortunately a full investigation has not, so far as I am aware, ever been made here, nor can I find reference to any similar affection in fowls in the literature I have searched.

HISTORY.

A poultry-keeper in one of the outer suburbs of Melbourne called at the Melbourne University Veterinary School during the middle of 1912 regarding a diseased condition affecting the wattles of some of his birds. The disease first appeared about three years ago, but was not extensive until the autumn, when the owner had over fifty birds affected, the mortality being about 5 per cent. Up to this time the disease had been confined to certain pens of young cockerels, and occurred chiefly during the early winter months. The symptoms shown were sudden enlargement of the lobes, due to more or less distension with fluid with usually no systemic disturbance, followed by gradual absorption of fluid and thickening of the wattle by fibrous tissue with, in some cases, nodules of necrotic material in the tissue beneath the mandible. Necrotic material also frequently forms immediately under old scars such as acquired by birds when fighting, but in this case, although sharply marked off from the healthy tissue, it is rarely cast off, and lies embedded in fissures on the surface of the now very much crinkled wattle.

The owner had attempted treatment by means of setons and

removal of the necrotic tissue as formed, and had met with some success, but the disease was a serious matter for him, not so much from the death of birds as from the great disfigurement produced in the large and showy wattles of valuable birds.

Following an investigation of the subject and the contagious nature of the disease having been demonstrated, the owner was recommended to clean up thoroughly and disinfect his yards and houses, to segregate or kill affected birds, or to have their wattles "cropped." After the adoption of these precautions the owner suffered no loss for some months, when he again brought in some affected birds (hens). These had had a large run, but the owner dug it up and top-dressed with lime those parts where the fowls congregated chiefly near the entrance to the fowl-house, and segregated the affected birds. This again has resulted in a disappearance of the complaint.

BIRDS AFFECTED: PROBABLE METHOD OF INFECTION.

These were all pure-bred White Leghorns, and the first two brought were fine, well-grown young cockerels with large comb and very large wattles, the latter being from $2\frac{1}{2}$ to 3 in. long and broad in proportion. When feeding they brushed along the ground, and as will be seen later, this probably provides the means of infection through either scratches obtained when brushing against sharp objects or received when fighting.

The hens brought later were also young. Though their wattles were, of course, not so large, they would be liable to infection in a similar manner.

CAUSE.

From all the birds, with the exception of one hen which had been affected for some weeks, we have isolated a coccobacillus indistinguishable from that of chicken cholera, both culturally and in its pathogenicity, and with which, further, we have been able to produce the disease experimentally. Chicken cholera is very prevalent around Melbourne, and frequently fowls bought in the open market are found to show more or less immunity to pasteurella inoculation, at least in small doses.

NATURAL CASES.

No. 1.—Cockerel. Ailing three days.

Both wattles were cedematous, the lower third of the left being cold, partly gangrenous, livid in colour, sharply defined, and there

was some clear cedema exuding from the surface. There was a scab on this wattle, evidently representing a recent injury. Both wattles were considerably thickened ($\frac{1}{2}$ in. thick), the edges rounded, hot except for the gangrenous portion, and hung down for about $3\frac{1}{2}$ in. from the mandible. The tips of the comb were also livid and slightly cedematous.

The bird was dull, appetite gone, feathers ruffled, and it sat huddled in a corner of the box and presenting a very dejected appearance.

The following day the bird was found dead, and *post-mortem* examination made some hours after death showed no lesions apart from those affecting the wattles. These were extremely cedematous from tip to base, uniformly affected but for slightly greater thickness at tip, to which the fluid had partly gravitated. On incision a clear fluid readily exuded from the surface and the wattles were readily compressed almost to normal thickness, there being little new fibrous tissue.

Smears from the cedema showed on microscopical examination many coccobacilli (often like small diplococci), apparently pure. Other organs, including the blood, showed no organisms or spirochaetes.

Agar cultures from the cedema showed in twenty-four hours a profuse growth of small translucent dew-like colonies of coccobacilli and two colonies of *Staphylococcus albus*.

Pipettes of heart blood on inoculation showed many coccobacilli varying somewhat in form and size, but showing distinct bipolar staining. Cultures showed the same organisms as was present in the cedema, apparently pure.

Sections of wattle showed on microscopical examination much cedema of subcutaneous tissue beneath the blood sinuses with some blood extravasation from one or two blood spaces near edge. Numerous coccobacilli present in cedema and a few in blood, but no other organisms detected.

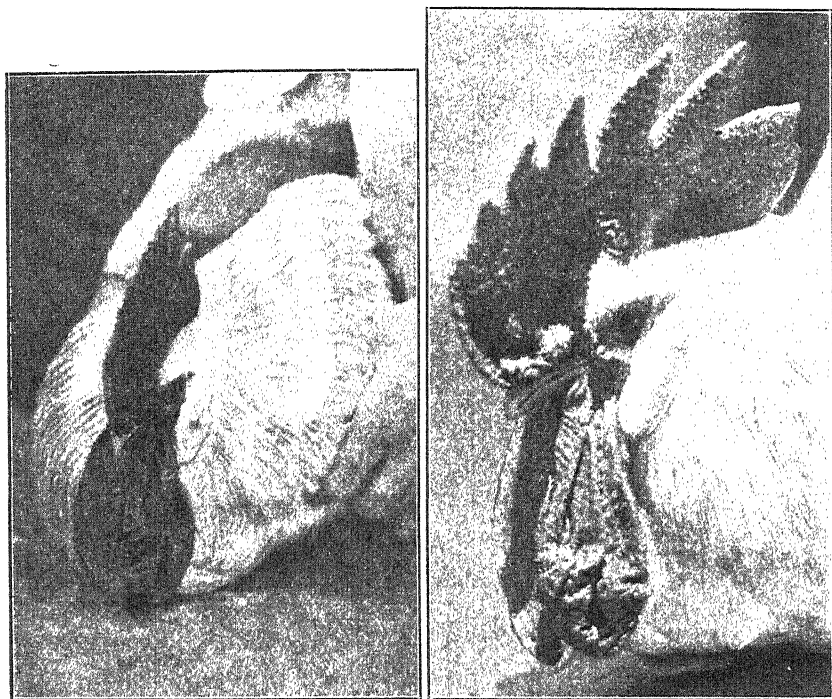
No. 2.—Ailing three days.

The left wattle was swollen, hot and cedematous, and there was on the surface a small line of scab, such as results from a scratch. The other wattle was normal, and remained so throughout observation.

This bird manifested no systemic disturbance and so was kept for observation. During this time the following changes

in the wattle were noted. Fourteen days after admission the scabs showed some tendency to slough off; portions could easily be pulled off while a serous material exuded from the edges of the wound on pressure. Examination of this fluid revealed the presence of coccobacilli. The wattle was now firmer to the touch and not hotter than normal.

The tissue at the base of the wattle became somewhat indurated, and later a small nodule could be felt there. This nodule



FIGS. 1 and 2. Case No. 2.—Photographs of affected wattle at intervals of 3 months.

gradually implicated a small portion of skin on the outer surface, and thirty-eight days after admission this was followed by the attempted sloughing off of the necrotic skin and nodule underneath. The attempt, however, was only partly successful, as three weeks later it was noted that the scabs seem to recede into the wattle and, apart from one or two scabs, sloughing off show no tendency to resolution. The wattle therefore became

corrugated, being at its thicker portions still $\frac{3}{8}$ in. thick (see photograph, p. 27).

Three months later (see photograph) the necrotic masses are found to be embedded in sinuses in the thickened wattle. Removal shows a hole right through the wattle. The line of demarcation between the live tissue and necrosed material is sharply marked off. The wattle, though retaining its normal colour, is now quite dense to the touch, and the bird, though



FIG. 3. Case No. 3.—Hen.

affected for five and a half months, has never manifested any general symptoms of illness.

Five months after this bird was received here it received a subcutaneous injection of virulent culture (see Rabbit 89 and Fowl 5), but remained normal.

Five months after the previous cases were brought under notice the same owner presented three hens for examination.

No. 3.—Hen. Affected about a month (see photograph).

Right wattle ovoid in shape, measuring about 1 in. long by $\frac{3}{4}$ in. wide, and being $\frac{1}{2}$ in. thick. There were old scars on the inner surface, from one of which a fluid, slightly milky in appearance, exuded on pressure. On the outer surface there is an old cicatrix with shrinking of the surrounding skin.

Left wattle was the size of a walnut, spherical in contour and about 1 in. in diameter. The edge was rounded and not apparent except for a line in the skin.

Both wattles were of a normal colour, slightly hot, œdematous, but fluctuating in parts. Between the wattles (that is, in the intermaxillary space) an irregular hard mass the size of a pea was to be felt.

Inside the lower lid of the left orbit was a small bladder-like structure the size of a pea, freely movable, and with fluid contents whey-like in appearance. The comb was not affected. Smears of fluid within the wattles showed numerous organisms, chiefly coccobacilli.

It was doubted at first whether this spherical phase with whey-like fluid was of the same nature as the other cases, but in view of the statement of the owner that the bird was at first affected with the purely œdematous form, that a few others have been similarly affected, and that on cultures the same coccobacillus was recovered, leads one to the conclusion that this case ought to be mentioned here, and that the apparent atypical lesions were due to the presence of other organisms, as noted above.

No. 4.—Hen. Ailing four days (see photograph, p. 30).

Right wattle was much enlarged, edges rounded and $\frac{1}{4}$ in. thick. Œdematous, tense and hot. No evidence of injury.

Left wattle enlarged to two-thirds the size of the right, edges rounded. There was an old abrasion on the inner surface. On the outer surface was an area of purplish discoloration, 1 in. long by $\frac{3}{4}$ in. wide, extending upward from the tip of the wattle, which is livid. This coloration ends abruptly. The wattle was firmer and not so œdematous as the right. The comb was slightly œdematous at the base.

Smears of œdema obtained by puncture with a pipette show numerous coccobacilli, which were obtained in pure culture on agar inoculated therefrom.

No. 5.—Hen. Affected about a month.

Right wattle was shrunken and much wrinkled about old



FIG. 4. Case No. 4.—Hen.



FIG. 5. Case No. 5.—Hen.

abrasions, now represented by fissures containing necrotic material. No œdema. There was a hard mass at the base of the wattle.

Left wattle was thickened to $\frac{1}{4}$ in. Edges rounded. Two old abrasions, one on inner the other on outer surface. The wattle was firm to the touch and still rather hotter than its fellow. The skin was commencing to shrink. No œdema was obtainable on puncture.

From these three hens the wattles were removed by the knife. In Nos. 3 and 5 the necrotic mass at base was found to extend into the intermaxillary space. It was surrounded by little fibrous tissue, irregular in contour, very hard, almost horny, and of a yellowish-brown colour. Smears showed only dead tissue elements and no organisms. The birds recovered, and though thus mutilated do not seem to suffer any discomfort.

EXPERIMENTS.

Pigeon.—Inoculated in pectoral muscles with two drops emulsion of agar culture from œdema of No. 1, and died in about forty hours. *Post-mortem* examination showed slight necrosis of muscle at seat of inoculation, congestion of intestines, otherwise all organs appeared normal. Microscopical examination of blood showed numerous coccobacilli.

Rabbit 83.—Inoculated subcutaneously with 0.5 c.c. of broth culture from blood of pigeon. Died in about twenty hours, and on *post-mortem* examination showed typical lesions of pasteurellosis. Microscopical examination of heart blood showed numerous coccobacilli.

Rabbit 89.—Inoculated with 0.25 c.c. first subculture twenty-four hours old on broth from œdema of Fowl No. 4, and succumbed in eighteen hours, *post-mortem* examination showing marked infection of all vessels, with small hæmorrhages in muscles, congestion of liver and kidneys, &c. Smears from heart blood showed numerous coccobacilli.

Fowls.—*E. F.*, 1—Rooster, Barred Plymouth Rock. (This bird had been kept at the School for the past month, during which time it had manifested no illness.)

With emulsion of agar culture from œdema of No. 1 smeared wattles on left side, and on right side after lightly scarifying with needle.

The following day the bird was dejected, plumage ruffled, slight diarrhoea. Wattles normal, except for small blood scabs along lines of scarification. The next day, however, the right wattle was hot and slightly œdematous, especially at part where it joins the head. There was intense conjunctivitis of the right orbit, the lids being closed, and the peri-orbital tissues very œdematous. The left wattle was also hot, but not œdematous, and the comb was hot and slightly œdematous. The bird was off its feed, dull, walked with staggy gait, tail turned to one side. Diarrhoea persisted and the temperature was raised.

Two days later the wattles felt cold, clammy, and there was œdema at the base. Conjunctivitis lessened. The bird continued during the next two days to show diarrhoea and dulness and ate but little. The lower portions of both wattles became livid and small beads of œdema exuded from the surface, but the wattles were not much thickened.

On the seventh day after inoculation the bird appeared much the same, but the wattles thickened, due to œdema, especially at the lower edge. The eye was still closed.

Thereafter the general condition of the bird improved, the wattles for the next week were œdematous and cold, later becoming normal, and a small indurated mass could be felt inferior to the right orbit.

The bird was then placed in a pen which had been occupied by Case No. 2. This pen after its previous tenant had purposely been left uncleaned, and the droppings of the fowls were mixed with ashes and the grain mixed along with this.

No results followed till a week later, when marked œdema of the infra-orbital subcutaneous tissues was again noted. This œdema spread round lower jaw to the base of the wattles.

Fourteen days after placing in this pen the bird was killed. *Post-mortem* examination showed dense necrotic mass, size of a split pea, just below the orbit, the surrounding tissue being somewhat œdematous.

Smears and cultures from the edge of the necrotic material showed coccobacilli.

E. F., 3.—Rooster—Game cross.—The left wattle was lightly scarified, and one drop of a twenty-four hours' old broth culture from pigeon was rubbed into the lines.

Two days later the lower edge of the wattle was thickened

and œdematous, forming a triangular area with apex at the end of one of the scars. This swelling gradually increased in size till it measured about half an inch along each side, and remained so for about five days, after which it receded slightly from the periphery of the wattle. At the end of a week the scars rapidly healed, the fluid became absorbed, and the swelling gave place to a shot-like body, with little fibrous tissue surrounding it, within the tissue of the wattle. This shot-like nodule gradually became degenerated and of a yellowish-brown colour.

Two months later the experiment was tried on the other wattle, but the bird did not become affected, nor did it succumb to a subcutaneous injection of virulent culture (see Rabbit 89).

A month later the animal was killed, when the nodule was found to be similar in appearance to that met with in the deeper parts of the wattles of natural cases.

E. F., 5.—Hen.—Inoculated in pectoral muscles with 0.25 c.c. culture as used for Rabbit 89, and succumbed in twenty-four hours, *post-mortem* examination showing little beyond congestion of all organs and blood extravasation at seat of inoculation. Microscopical examination showed numerous coccobacilli in tissues at seat and in the blood, especially after incubation.

SUMMARY OF EXPERIMENTS.

Pigeon, Rabbits 83 and 89.—Subsequent inoculation of culture. Result: Death (pigeon, forty hours; rabbits, eighteen and twenty hours). *Post-mortem* examination characteristic of pasteurellosis. Coccobacilli numerous in blood, &c., especially after incubation.

Fowls.—*E. F.*, 1.—Scarification and rubbing in of culture. Result: General illness, conjunctivitis, œdema of wattle, diarrhœa, formation of necrotic material, and when killed fourteen days after inoculation showed little change, apart from lesions in head, from which latter the coccobacilli were recovered.

E. F., 3.—Scarification and rubbing in of culture. Result: Œdema; necrosis. Immunity to subsequent scarifications and a subcutaneous inoculation of virulent culture.

E. F., 5.—Subcutaneous inoculation of culture. Result: Death. *Post-mortem* examination: Congestion of organs, &c.; coccobacilli in blood, &c.

E. F., 2.—Immunity to subsequent injection of culture.

SUMMARY.

(1) The breed affected in the cases under review was White Leghorn, but probably any breed with large wattles would be liable to the complaint. It has been produced experimentally in other breeds of fowls.

(2) In natural cases or following scarification and rubbing in of culture the first symptom noticed is the rapid swelling of the wattles, due to the presence of cedema, which may also be found exuding from the surface.

(3) Septicæmia and death occurs in a certain percentage of cases.

(4) The disease usually runs a chronic course with subsequent replacing of the fluid by fibrous tissue, formation of nodules of necrotic material, and results in the wattle assuming a crinkled appearance.

(5) Cause, a *pasteurella*, apparently identical with that causing chicken cholera. Produces a septicæmia with early death on inoculation into pigeons and rabbits.

(6) Entrance is probably through wounds obtained while scratching, fighting, &c.

(7) Immunity is attained in chronic cases, which, however, are probably capable of acting as "carriers."

(8) Cases amenable to treatment by "cropping" of the wattles.

(9) Adoption of sanitary measures of benefit in suppression of the disease.

TUBERCULOSIS IN DOGS.

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RECENTLY, while working as a research scholar at the Melbourne University Veterinary School, I had the opportunity of holding *post-mortem* examinations on two cases of tuberculosis in canine patients.

In view of the fact that tuberculosis is regarded as somewhat rare in the dog, and considering the atypical symptoms and lesions present in both cases, I consider that it is of interest to place on record the following observations.

In neither case was there any rapid progressive cachexia, as is said to be the most constant symptom in dogs, nor was there any cough. In both cases the most pronounced symptom was ascites, which developed rapidly in the last week prior to operation. Considering the extent of the infection in both cases and the organs involved, it is remarkable that the dogs did not become emaciated and no symptoms should have developed until the disease was so far advanced.

These facts, combined with the fact that no tubercle bacilli were discovered in the smears made from the caseous areas, although many were examined, made the diagnosis very difficult. It was only by intraperitoneal inoculation of a guinea-pig that I was able to prove the real nature of the disease, and later, after staining many sections by Ziehl-Nielsen's method, I was able to demonstrate in a very few cases the presence of tubercle bacilli in the lesions.

Each case will be dealt with separately, only the main features of the *post-mortem* and histological examinations being detailed.

Case 1.—Bull terrier bitch brought into the hospital to be treated for fracture of the femur. The animal developed ascites a few days later, and showed some general disturbance in health. In about five days the ascites developed very rapidly, when the abdomen became greatly increased in size. It was decided to tap and hold an exploratory operation. The fluid was let out of the abdomen by an incision in the median line. The fluid was cloudy, dirty, and slightly blood-tinged. Roughly, two gallons of fluid were removed. The liver was then palpated and found to possess large nodular masses. The incision was enlarged and the liver observed. There were large greyish umbilicated masses throughout. The condition was diagnosed as carcinoma, and it was decided to destroy the animal.

On *post-mortem* examination the liver was seen to be very enlarged and extensively affected with greyish-yellow nodules, varying in size from a little larger than a pin's head to the size of a walnut. The larger masses, which were umbilicated in the centre, were a little denser in consistence than normal liver tissue, and raised above the surface of the liver. On further examining the organ it was found that an abscess had formed in one lobe and had ruptured, leaving very irregular lacerated edges. The spleen was extensively affected with umbilicated areas about 2 in.

in diameter and raised above the surface of the organ. The lymphatic glands of the region were swollen and contained yellowish necrosed areas. Throughout almost the whole length of the intestine numerous yellow nodules about the size of a pin's head were scattered irregularly. Both kidneys contained nodules in the cortex, varying in size, raised above the surface and greyish-yellow in colour. The lungs were denser than

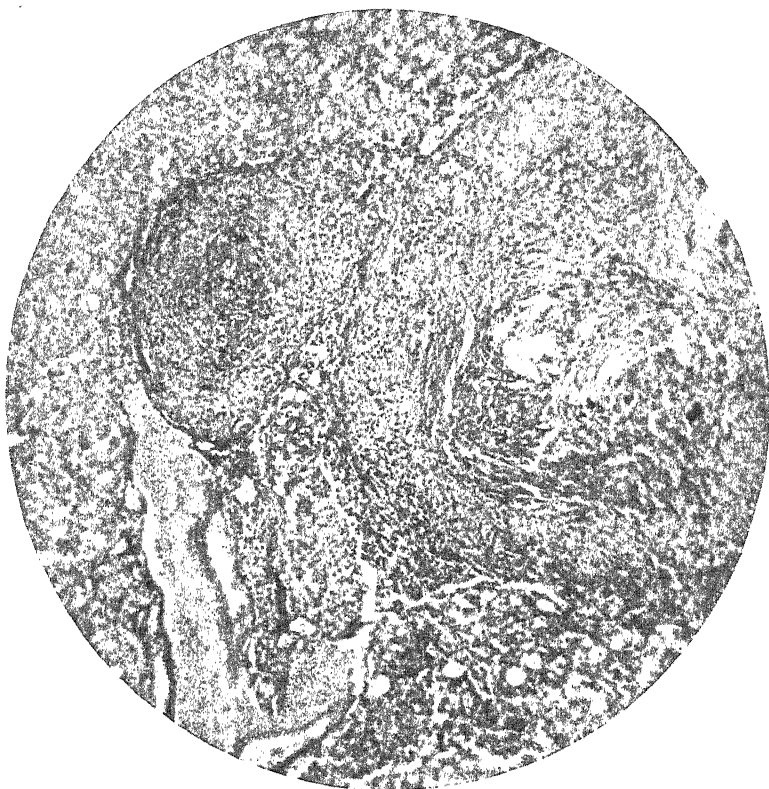


FIG. 1.—Section of liver with two lesions showing. The streaky degeneration is well shown in the older and larger lesion. Photomicrograph $\times 72$.

normal, and on section were found to contain throughout small translucent greyish areas up to 1 cm. in diameter, or sometimes several agglomerated together to form a larger dense translucent mass. The mediastinal lymph glands showed small greyish-yellow necrotic areas. The heart was normal.

Sections for microscopical examination were taken of all the

organs affected. Histological examination showed lesions of the same character in each organ.

Liver.—A piece of liver apparently normal to the naked eye shows on section numerous nodules of cell accumulation irregular in distribution, but sometimes closely associated with the portal canals. These nodules consist of endothelial (epithelioid) cells, small mononuclear leucocytes, and lymphocytes. The endothelial cells rapidly degenerate. There is no breaking up, but a disappearance of the chromatin, the nuclei losing all staining properties. The cells exhibit a change somewhat akin to fatty degeneration, but there is no breaking up into a fatty granular *débris* as is usual in caseation. The degenerated material becomes reticulate and then streaky, taking the fuchsin stain of the Van Gieson (fig. 1). Later it tends to take more of the picric, but there is always a mixture of the red and yellow. With eosin it takes a uniformly pink stain. Also, when the degeneration is

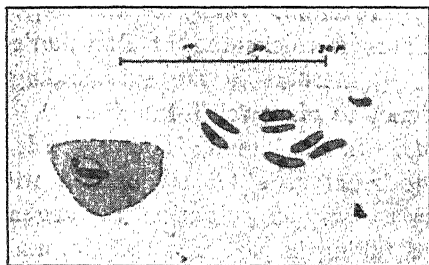


FIG. 2.—Group of spores of some protozoan parasites in the liver of Case 1.
(Drawn by aid of camera lucida.)

further advanced, there is an extensive accumulation and invasion of polymorphs. There is also an attempt on the part of the fibroblasts to lay down a loose scanty capsule of fibrous tissue. There is little or no attempt at giant cell formation, only one giant cell being found after numerous sections had been examined. There are numerous small hæmorrhages into the surrounding liver substance, and sometimes small hæmorrhages into the nodules.

Nodules combine, and result in the formation of large areas consisting almost completely of a streaky degenerated material.

It is worthy of record that in one of the liver sections stained

by Giemsa's method a group of sporozoites of some sporozoan parasite was found. These sporozoites are ovoid bodies, tapering at either end, and containing in their centre a definite nucleus which takes on a deep red stain. These spores measure from $5.99\ \mu$ to $6.2\ \mu$ long, and $1.2\ \mu$ to $1.7\ \mu$ broad. One spore had entered a live cell and was lying above the nucleus (fig. 2). As yet only one group of spores has been found, and no further stage of the parasite detected.

Kidney.—The same type of lesions as seen in the liver is also to be seen in the cortex of the kidney.

The kidney tubules lose their epithelial lining, leaving empty spaces, which soon become obliterated by the rapidly multiplying fibroblasts and the accumulation of leucocytes at the periphery of the nodules. The glomeruli are more resistant, and one or more are often to be seen very shrunk from Bowman's capsule. The endothelial cells are more loosely packed, and there is less tendency to degeneration than in the liver, although there is a strong polymorph reaction. Many of the larger blood-vessels are sclerotic. There is thickening of Bowman's capsule and a shrinking of the glomerulus in the surrounding kidney tissue. There is no tendency to giant cell formation.

Lymph Glands.—In the lymph glands there is the same accumulation of endothelial cells loosely packed with a very pronounced tendency to early degeneration, the degenerated material being streaky and taking in parts the fuchsin, and in other parts the picric of Van Gieson. There is little or no polymorph reaction. The blood-vessels are congested in the surrounding lymphoid tissue, and there are numerous small hæmorrhages.

Intestine.—Two small pieces of intestine were taken for examination of the small caseous nodules. On section the caseous nodules are found to be situated in the inner and outer muscular coats respectively. These nodules consist entirely of a degenerated (calcareous) material enclosed in a thin fibrous capsule. Probably they are due to the invasion of some metazoan parasite.

The outer muscular coat of the intestine is almost completely atrophied, and its place taken by a typical granulating tissue with capillaries (fig. 3). There is also a large invasion of polymorphs. Between the muscle fibres and at times intra-cellularly are to be seen protozoan-like bodies. These are very delicate, long,

spindle-shaped bodies measuring $17.1\ \mu$ to $27.3\ \mu$ long, and $5.9\ \mu$ to $6.4\ \mu$ broad, containing a very finely reticulate protoplasm, with usually one, sometimes two, spherical nuclei situated more or less in the centre, and sometimes to one side (fig. 4). These protozoan-like bodies stain faintly blue with Giemsa. Sometimes their ends, which are very tapering, remain clear. What appears to be a younger stage varies from a spherical to an oval shape,



FIG. 3.—Section of intestine of Case 1 showing atrophic external muscular coat and invasion of round cells. A caseo-calcareous cyst is shown in the internal muscular coat. Photomicrograph $\times 108$.

measures $7.2\ \mu$ in the long axis, has scattered chromatin points in a faintly reticulate protoplasm, and stains reddish-purple with Giemsa. The same protozoan-like bodies can occasionally be picked up in the mucous membrane. These lesions are unusual. I can find no record of any similar lesions in any of the literature I have searched.

It is impossible to be dogmatic about the nature of the cellular bodies associated with the muscle atrophy, but I am inclined to the belief that they are protozoan in nature.

There were no tubercular ulcerations in the intestines, and it is improbable that the lesions described in the muscular coats are in any way associated with the presence of tubercle bacilli in other situations of the body.

Lung.—Sections of the lung show numerous cell accumulations of the same character as those described for the liver. There is a slightly greater reaction of the fibroblasts and a bigger accumulation of lymphocytes, while there is little or no polymorph reaction. These lesions tend to degenerate early, and the caseation is of the same atypical character as seen in all the lesions. Here and there these lesions are closely connected with bronchi, and a commencing ulceration of the mucous membrane can be seen.

Case 2.—A Manchester terrier with ascites was brought into the hospital for treatment. The dog was in good condition, and showed nothing more than a very large and tense abdomen. It was decided to hold an exploratory operation, and that the dog should be destroyed if any extensive liver lesions were present. The ascitic fluid was drained, about a gallon of clear straw-coloured fluid being removed. It was then seen that the mesentery and liver were extensively affected with small caseous nodules. The dog was killed. On *post-mortem* examination the liver was found to be enlarged, and to contain throughout its substance numerous small caseous nodules, while in some places many had united to form larger masses of degenerated material somewhat of the consistence of dough. These areas were raised above the normal surface of the liver, and some showed an umbilicated centre. The hepatic lymph gland showed caseous areas. The mesentery contained a few scattered nodules, while in the region of the pancreas there was a large mass about 5 in. in length and 2 in. in thickness, this being an accumulation of small caseous nodules (see C, fig. 5). The spleen was normal in appearance. Both kidneys showed small caseous nodules in the cortex.

On opening the thorax the pericardium was seen to be greatly distended by fluid. About a pint and a half of clear fluid was removed from the pericardial sac. The heart was seen to contain

a large irregular greyish mass in the muscle of the left ventricle, and smaller areas were situated in different parts of the heart muscles of both ventricles (see E, fig. 5).

The lungs and mediastinal lymphatic glands were perfectly normal. Histological examination shows lesions of exactly the same kind as those in Case 1. In the liver there is slightly more fibrous tissue reaction at the periphery of the lesions, but the cell accumulation and degeneration are of the same character as previously described. The kidney shows the same type of reaction. There is no attempt at giant cell formation, and no calcification of any of the lesions.

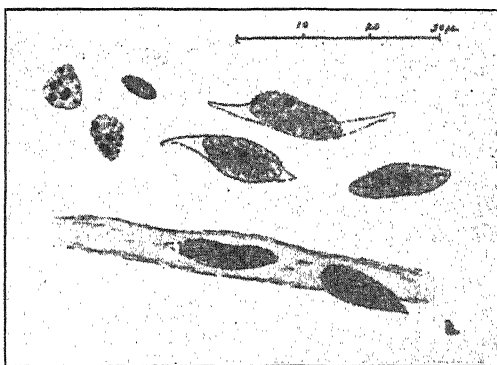


FIG. 4.--Protozoan-like bodies from the external muscular coat of intestine in Case 1. (Camera lucida.)

The heart shows a thickening of the epicardium, in parts of which there are typical cell accumulations and degeneration. Scattered throughout the heart muscle are numerous lesions irregularly spherical or elliptical in shape. These also show early degeneration. The predominant cells are the epithelioid cells situated in the cortex of the lesions and leucocytes, small mononuclears, and lymphocytes towards the periphery. There is no polymorph reaction, and the fibroblasts are more active in the older lesions. The muscle fibres surrounding the lesions are only slightly atrophic.

EXPERIMENTS.

An emulsion of the tissue from the heart lesions was made, and two guinea-pigs and two dogs were inoculated.

Guinea-pig 329 was inoculated with 2 c.c. of the emulsion

intraperitoneally, and guinea-pig 330 with the same dose subcutaneously. Dog 1 was inoculated with 3 c.c. intraperitoneally, and dog 2 with the same dose subcutaneously.

Guinea-pig 329 was dead twenty days after the inoculation. It showed a small amount of fluid in the peritoneal cavity. The peritoneum, particularly on the left side, was thickly studded with numerous greyish nodules, more thickly massed in the superior part posterior to the kidney. The mesentery, the small intestines, and large intestines were studded with nodules, and in the region

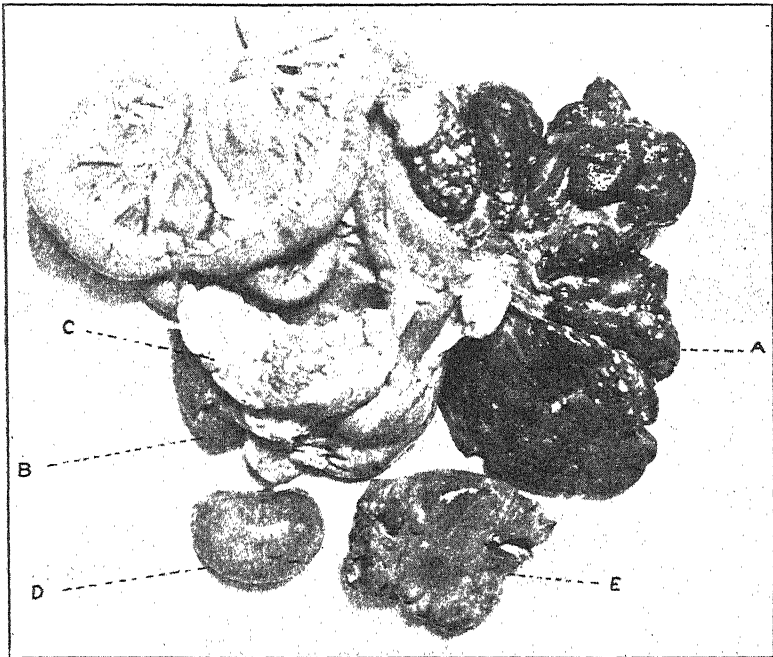


FIG. 5.—Viscera from Case 2. A, liver; B, spleen; C, large collection of small caseous nodules; D, kidney; E, heart.

of the pancreas contained large masses of nodules. The spleen contained many small yellowish-grey nodules throughout. The lymph glands of the region were swollen, and contained larger or smaller yellowish caseous-looking areas. The peritoneum covering the kidneys, testicles, and bladder was studded with typical nodules translucent at the edges, opaque and yellowish in the centre. Three of the supra-sternal lymph glands were large and caseous, while the thoracic viscera was normal; smears show

numerous tubercle bacilli of the human type. Sections show numerous acid-fast bacilli in typical caseous areas. There is also typical giant-cell formation.

Guinea-pig 330 was killed forty-six days after inoculation. The precrucial lymph glands on side of inoculation were enlarged, containing caseous areas. Lymph glands in the pelvic region were large and caseous. The spleen and liver contained many greyish translucent areas. Tubercle bacilli were numerous in the lesions.

Dog 1 was killed forty-six days after inoculation. The organs of both cavities presented a perfectly normal appearance. There was one small isolated caseous nodule in the parietal peritoneum.

SUMMARY.

In both cases the chief symptom was ascites.

Liver.—In Case 1 the lesions presented somewhat the appearance of a new growth.

In Case 2 they approached more nearly to the typical appearance of tubercular caseation.

Mesentery.—In Case 1 it was free from infection.

In Case 2 it was extensively involved, reminding one of the sausage-shaped tumour formed by rolled-up matter omentum in tubercular peritonitis of the human subject.

Spleen.—In Case 1 the lesions were large, and showed pronounced umbilication.

In Case 2 it was apparently normal.

Kidneys.—In both cases they were affected.

Lungs.—In Case 1 they contained throughout their substance grey translucent areas.

In Case 2 they were perfectly normal in appearance.

Heart and Pericardium.—In Case 1 they were perfectly normal

In Case 2 the pericardial sac was filled with a large quantity of clear fluid, and the heart muscle was extensively affected.

Degeneration.—In Case 1 the caseation was typical in consistence, but varied greatly in colour.

In Case 2 the consistence was much softer and more doughy than usual.

In neither case was there any calcification of the lesions.

The situation of the lesions varies greatly in both cases. The extensive affection of the heart muscle in Case 2 and the perfectly

normal appearance of the lungs and pleura present a feature of special interest.

These variations in the organs affected and the macroscopic character of the lesions, combined with the absence of tubercle bacilli in the smears, render diagnosis difficult.

Microscopically, the features most worthy of note are: The rapid degeneration of the epithelioid and other cells in the lesions, the atypical caseation produced by this degeneration, the comparative absence of any giant cell formation, and the absence of any marked fibrous tissue reaction.

The fact that the tubercle bacilli were of the human type supports the view expressed by Nocard and others that dogs may become infected by the ingestion of human sputa, vomited matter, or leavings of food, or by inhalation of virulent dust resulting from the drying of the sputa.

The history of the owners could not be traced.

In conclusion, I wish to support the view held by Nocard that ascites, hydrothorax, and hydropericardium in dogs ought to always make one suspicious of tuberculosis, and that diagnosis is best made by drawing off a fairly large quantity of the liquid, centrifugalizing it, and inoculating a guinea-pig intraperitoneally with the residue.

Or an exploratory operation can be made, some of the material from a lesion removed by a sterile pipette, and a guinea-pig inoculated.

VETERINARY HOSPITALS DURING WAR.

BY MAJOR R. C. COCHRANE, F.R.C.V.S., A.V.C.

(a) CONSIDERED FINANCIALLY.

(b) AS A CHANNEL FOR CONVEYANCE OF REMOUNTS FROM THE BASE TO UNITS IN THE FIELD.

THE question of the economic value of veterinary hospitals during times of war is a subject which deserves close attention. Until the South African War veterinary officers received inadequate training in veterinary hospital administration, and although the general administration and organization of veterinary hospitals have been considerably improved of late years, it is, perhaps, not out of place to consider what value, more particularly from a financial aspect, veterinary hospitals can be to an army in the field, and the saving that can be made to the State generally.

The figures which I propose to utilize were collected by me during the late South African War (1899-1902) for my own information, in order to arrive at a decision with regard to the

financial relation existing between the value of a sick horse admitted to a veterinary hospital, and the daily expenses entailed by his keep and treatment; also to discover the period of time during which it would be profitable to keep a horse under treatment, or whether it would be more economical to destroy him at once.

Many cases occurred where horses were sent into veterinary hospitals with serious injuries, combined with mange, old age, or some unsoundness, and being curable, veterinary officers did not always look at the case from a financial aspect, but detained the horse so long in hospital that his keep and treatment cost more than he was worth; in some cases the animal had eventually to be destroyed, thereby making the loss still greater. If veterinary officers had appreciated more fully the financial side of their work, it is probable that a considerably greater saving could have been effected.

When a horse is admitted for treatment a mental calculation should be made as to the value of the animal when fit for issue, due consideration being given to the probability of his responding to treatment or not. If this value be placed on the credit side, and on the debit side the approximate cost of his treatment, which is the anticipated duration of his stay in days multiplied by the daily cost of his keep, then by striking a balance it will be seen whether the horse is worth the treatment or not. It must, however, always be remembered that the value of a horse varies considerably with the question of supply and demand, and one must not be too hasty in ordering the destruction of any animal that could be cured, even if only rendered temporarily efficient.

As far as I could ascertain, there were no statistics upon which to form an opinion, and it was therefore almost impossible without lengthy calculations for an executive veterinary officer to form an estimate of the daily cost of the keep and treatment of a sick horse.

My calculations were made on the following lines:—

The various accounts of the Veterinary Hospital at Middelburg, Transvaal, were first carefully examined for the previous six months. During this time the average daily wastage under each heading was taken, valued, and shown as depreciation under separate items, and placed on the debit side in Table I. Wages and rations, at Army rates, of all officers, soldiers, civilians, and natives were also placed on the debit side. In fact, as far as possible, an account, including expenditure and depreciation, was drawn up on business lines.

A very accurate account was kept of all medicines issued to the Veterinary Hospital, and used there. In this item I was able to be very exact, as the Medical Store Depôt and the

Veterinary Hospital, although treated as separate institutions, were both under my care. No charge was made for instruments, as these were returnable to store, but in practice a certain sum should be debited on this account as depreciation.

The prices of horse rations (which may appear excessive) were taken from figures supplied to me by the Army Service Corps.

It is almost impossible to work out to an exact figure the actual daily cost of keep of a sick horse in a veterinary hospital, when the horse population is a floating one, but the average daily number of horses in the Veterinary Hospital quoted during the period taken was as nearly as possible 1,500.

From the figures shown in Table I., the daily cost of keep of 1,500 sick horses with everything included, amounts to £245 11s. 5d. This gives the daily cost of one horse as 3s. 3½d.; but necessarily this will vary with the increase or decrease of numbers, and it will be easily understood that the fewer the horses the more expensive is the upkeep of the individual animal; and the reverse up to certain limits holds good. This is accounted for by the fact that the same staff is generally allotted to 250 horses as to 500 or more, attendants on the horses not being included.

No charge is made against the Veterinary Hospital for R.E. expenditure, but when these tables were compiled no R.E. expenditure had been incurred. The fencing, flooring of standings, drainage, &c., were undertaken solely by the Veterinary Hospital staff. Later on, during the war, considerable R.E. expenditure was incurred in this veterinary hospital, such as corrugated iron sheds for 500 horses, feeding troughs for all horses, erection of corrugated iron pharmacy, office, forge, forage shed, and messing-shed for men. These were all eventually pulled down, and used for other purposes when the Veterinary Hospital was abolished, so that actually the R.E. expenditure amounts to the cost of erection, plus the sum allotted by the R.E. for wear and tear of materials which were used or sold later on. Against this may be obviously placed the more efficient treatment and feeding of horses, with the consequent saving of mortality.

It is hardly necessary to point out the reduction in horse mortality when proper feeding troughs and sheds are provided, although this is not possible on service except for permanent base veterinary hospitals. I calculated that in feeding horses off the ground one-third of the grain ration was lost by being trodden under foot, and in wet weather feeding becomes impossible. When large numbers of horses have to be looked after it is impossible to feed them out of nose-bags except in a few

special cases. The loss in hay was considerable, but naturally not so large as the loss in grain.

The erection of shelters (however rough) saves hundreds of thin and debilitated horses; whereas when exposed to the cold winds and rain they die by scores.

Although R.E. expenditure is not shown in my calculation, it may be taken for granted that the sum spent by them later on was fully counterbalanced by the saving effected in animals, and by the shorter time horses were detained in hospitals; as the result of the better conditions these were under, their recovery was more rapid, and they were able to join the ranks sooner, and thus become of value to the Army.

However, I repeat no R.E. expenditure is taken into consideration in this paper, and usually, under service conditions, large R.E. expenditure would not be undertaken unless the campaign was continued a long time, and then only at base veterinary hospitals. Thus, under ordinary service conditions, in a veterinary hospital, the R.E. outlay would not be excessive.

Table I. shows the total daily expenditure in the Veterinary Hospital.

What strikes one particularly on examining the table is the enormous proportion the horse-rations bear to the total. It is held by some that rations for sick horses could be reduced; but usually the standard ration works out well, as the food not consumed by very sick horses is given to those which are thin and require feeding up. The rations, however, are the only item where any saving could be made; it must be remembered that veterinary hospitals are expected to send their patients out fit for duty, and therefore it is very questionable whether any reduction is to be recommended.

The low proportion of the total amount of the daily expenditure on professional and technical staff might certainly be increased with advantage.

The cost of medicine is not excessive.

From a veterinary point of view the cost of medicines is interesting, and it is probable that with careful discrimination the total might be reduced, by not issuing, or economizing *in war time* the issue of the very expensive drugs, and by a freer use of the less expensive. Still, a fifth of a penny per day per horse for medicines is not excessive, and if one takes the average time of detention of a sick animal in a veterinary hospital at two months, the medicine bill would amount to one shilling only.

Table II. is the balance sheet for six months; the figures on the debit side are arrived at by assuming that the average daily number of horses in the Veterinary Hospital was 1,500, at a daily cost of £245 11s. 5d., whilst the credit side shows the value of

the horse cured and issued for duty; £15 is purposely taken as a very low average price for a horse; every kind of animal was represented, from the ordinary country pony of South Africa, whose war value was well over £15, to the artillery horse which cost about £80, when landed in the country. There were usually some very young or useless horses, which helped to reduce the average value. No sum is placed on the debit side for the purchase price of horses admitted, because it is considered that they were of no practical value to the Army, being unfit for work when sent into the Veterinary Hospital. If a fair price were put on these practically valueless horses when admitted, a correspondingly higher price would be expected for them when issued. In a veterinary hospital where the numbers are continually altering, it is almost impossible to give without intricate calculations the actual total expenditure. The number of horses admitted and cured, as well as the number of casualties shown on the credit side, are taken from the case book kept in the Veterinary Hospital.

It is possible to argue about the valuation of sick horses in another way, namely, an animal is essentially a "fixed asset," and so should not be valued for what he would fetch, but at the cost of replacement less depreciation. But depreciation, if the horse is really serviceable, only means the deduction made because part of his working life is spent. If, however, he has as good a chance of lasting to the end of the war as an ordinary remount, his life will be as long as we want it to be. We shall hardly be looking even economically beyond the end of the war, and so might value him at the full cost of replacement.

It is possible, too, that the strictly anti-economic view would find much favour. Our object, it might be said, is to win the war on unlimited credit in the shortest space of time, therefore the question is not what a veterinary hospital costs, but whether it turns out serviceable horses in the quickest possible time with the least possible interference with other military enterprises.

The admissions show the amount of work in a veterinary hospital during war. The number of deaths and destructions (almost a third of the total admissions) point to the fact that units keep their horses too long, and that they wait until disease assumes a severe form, from which recovery is in many cases impossible. No doubt this, in the South African War, was due to the difficulty of getting fresh horses, as commanding officers argued that "any horse is better than none." Under more stringent orders with regard to admission of sick horses, the more careful administration in veterinary hospitals, and a larger staff for supervision, the profits which represent the utility on service of the veterinary hospitals should increase greatly owing to the

more efficient handling of sick horses; but, in order to make the hospitals as profitable as possible, improvements in remount arrangements are needed.

At a later period in the war the mortality was not by any means so large owing to the erection of stables, and provision of a larger staff of officers and men detailed to look after the sick.

In order to bring the information as nearly up to date as possible, I propose to apply my data to ascertaining the expenses of a veterinary section as provided by regulations (*vide* Table III.). The rates of pay of the establishment are taken from regulations, where laid down, and the prices of the rations and the various other items of expenditure are the proportionate share of the expenses incurred in a veterinary section on the same basis as in Table I.

It has been assumed that native labour for horse-keepers is not available, and that 14s. per week with keep and tentage is a fair wage.

Under these conditions the daily cost of treatment of a horse is more, amounting to 4s. 7d. a day (*vide* Table III.), as against 3s. 3d., but then it may be expected that, with a more efficient staff, better supervision, and admission for treatment at an earlier stage of disease, the mortality will not be so high, nor the period of detention so long, so that the amount shown on the credit side will be correspondingly increased.

In order to make veterinary sections still more profitable assets to the State, they should be fully equipped with establishment at the outbreak of a campaign and act as conveyers of fit horses between the mounted troops and the Remount Department. By this means a saving would be made of all remount depôt staffs, except those for the purchase and impressment of horses, while a continuous stream of fit animals could be passed up to the front, through veterinary sections, and a stream of sick horses, requiring prolonged detention, passed down by the same means to those places where more economical treatment and feeding of the sick could be undertaken.

This scheme would entail less work for the mounted troops, as when they send back sick horses they could draw fit ones from the same place, *i.e.*, the veterinary section in touch with them. It may be argued that it would be impossible to keep the healthy and diseased horses apart, but a workable arrangement can easily be devised, and, to anyone acquainted with active service conditions, it is well known that every remount depôt has always a very large number of sick in each depôt which do not come in contact with the healthy.

It may fairly be claimed that this scheme is economical and permits the remount officers to attend to their most important

duty, *i.e.*, the selection, purchase, and collection of horses suitable as remounts, for which they are specially qualified. The horses when collected should be handed over to a veterinary section (or probably two or three combined) at the base, and so drafted up through various sections to the mounted troops, to replace casualties. Remount dépôts require veterinary officers, but veterinary sections can be worked without remount officers and their staff, and, for this reason, it is suggested, veterinary sections should be selected as the means for conveying horses to the mounted troops. As war continues the issue of horses from remount dépôts is, in a great proportion, simply a re-issue of those which have been treated in veterinary hospitals and become fit. It would appear, therefore, that the proposed scheme must be economical.

If this plan were adopted it would make veterinary sections a still greater asset to an army than they are now, and abolish the rather cumbersome method of rehorsing mounted troops which prevails at present.

It will be noticed that it is only suggested that this scheme be adopted in war time, and that it in no way relieves remount officers of the responsibility for the purchase of suitable and fit horses as remounts.

In this short financial statement of the working of veterinary hospitals in war time, all references have been avoided to any advantage accruing to the Army from the fact that the sooner the horses are returned to the ranks the more efficient the mounted troops will be.

I believe that it is a recognized fact that if the troops had been more efficiently mounted during the South African War it would have been of *incalculable* advantage to the Army. With the advances made in aviation it appears possible that the army which is the better mounted and able to change its dispositions and move with the greatest speed will be at a considerable advantage; therefore it is all the more necessary that efficient remount and veterinary arrangements should be made.

If the facts in this article are admitted as correct, or approximately so, the following deductions can be drawn:—

(1) That veterinary hospitals or sections, if managed on economical lines, are a real saving to the State.

(2) That in order to be worked to the best advantage horses should be sent into the veterinary sections at an earlier stage of disease than is customary; and this means that the Remount Department should arrange for a more constant and *seasoned* class of remount, so as to enable commanding officers to send the sick horses into hospital at an early stage.

(3) Although since the South African War the Army Veteri-

nary Service has been reorganized so as to provide sections for the equipment of veterinary hospitals, it is, in my opinion, advisable that this number should be still further increased so as to enable officers, non-commissioned officers, and men to attain such peace training as will fully qualify them for their all-important work during war.

(4) That in order to administer a veterinary section in the most economical manner, no reduction in the staff laid down in regulations either of officers, non-commissioned officers, or men should be allowed.

(5) That more attention should be given to the question of shelter for sick horses and feeding arrangements when on service.

(6) That, in war time, veterinary sections should act as conveyers to fit horses between the Remount Department and the mounted troops.

Even admitting that the figures shown on the debit side of Table II. are under-estimated, the profit shown is so enormous that it would allow of considerable addition to the expenditure in a veterinary unit without working it at a loss to the State. The table points out conclusively that veterinary units, if run on sound lines, are a considerable financial asset to the Army, and the recent re-organization of the Army Veterinary Corps appears to have been fully justified.

TABLE I.

DAILY EXPENSES INCURRED BY A FIELD VETERINARY HOSPITAL. THE ACCOUNT IS BASED ON THE ASSUMPTION THAT AN AVERAGE OF 1,500 ANIMALS ARE IN THE HOSPITAL. THE TABLE INCLUDES THE PAY OF STAFF, EXPENDITURE ON RATIONS, MEDICINE, &c., AND LOSS DUE TO DEPRECIATION.

Description of Items.				£	s.	d.
(1)	Pay and allowances of Veterinary Officer (Lieut.)	...	...	1	0	8
(2)	Pay of Soldiers employed	...	...	1	15	6
(3)	Pay of Civilians employed	...	...	4	8	0
(4)	Pay of Natives employed (horse attendants)	...	...	17	14	8
(5)	Rations of above Staff	...	...	26	4	5
(6)	Medicine daily cost*	...	...	1	5	0
(7)	Wear and tear of equipment	...	...	4	15	2
(8)	Horse rations, 1,500 animals at 2s. 6d. per day per animal	...	...	187	10	0
(9)	Incidental expenses, such as instruments, stationery, postage, repairs to standings, enclosures, &c.	...	...	0	19	0
Total daily expenses				245	12	5
* Actual cost of medicine for six months				217	18	3½
Cost of carriage and transport abroad calculated at 5 per cent.				10	17	6
Total				£228	15	9½

These prices were taken from current price lists of Willows, Francis, Butler and Thompson, and Baird and Tatlock. The total sum of £228 15s. 9½d. represents the value of all issues from the Veterinary Store Dépôt to the Veterinary Hospital from April 1, 1901, to September 26, 1901.

TABLE II.

BALANCE SHEET FROM APRIL 1, 1901, TO OCTOBER 1, 1901.

CREDIT.		DEBIT.	
Total number of animals admitted from April 1 to October 1, 1901 (all unfit for services)	7,481	Expenses of hospital from April 1 to October 1, 1901— 183 days at £245 11 5	£44,939 9 3
Total number animals cured, April 1, 1901, to October 1, 1901	4,232		
Total number animals died and destroyed	1,790		
	6,022		
Remaining in hospital	1,459		
	7,481		
Cured (from average for previous 5 months)	879		
Died (from average for previous 5 months)	580		
	1,459		
Total cured	5,111		
Total died and destroyed	2,370		
	7,481		
5,111 animals at £15	£76,665 0 0	To credit	31,725 10 9
			£44,939 9 3

TABLE III.

DAILY EXPENSES OF A VETERINARY SECTION.

CALCULATION BASED ON THE ASSUMPTION THAT 250 HORSES ARE UNDER TREATMENT IN THE SECTION TOGETHER WITH STAFF ACCORDING TO REGULATIONS, UNDER SIMILAR CONDITIONS AS SHOWN IN TABLE I.

Description of Items.	£	s.	d.
(1) Pay and allowances of two Veterinary Officers*	2	6	0
(2) Pay of Staff (para. 778 and 779 Royal Warrant)	3	7	8
(3) Pay of 83 horse keepers at 2s.	8	6	0
(4) Rations of 114 Europeans at 1s. 9d.	9	19	6
(5) Medicine daily cost	0	4	2
(6) Wear and tear of equipment	1	13	7
(7) Horse rations 250 animals at 2s. 6d. per day per animal	31	5	0
(8) Incidental expenses	0	3	0
	£57	4	11

* An average figure taken, since the actual rate depends on the rank of officers doing duty with the Section.

—United Service Magazine.

Clinical Article.

AN INTERESTING ABDOMINAL CASE.

BY FREDERICK HOBDAV, F.R.C.V.S.

Kensington, W.

THE patient was a pedigree bull bitch, 4½ years old, which had been the subject of metritis for some six or eight months. She had never been allowed to have puppies, and the discharge was purulent and most excessive, especially during and immediately after œstrum. Persistent syringing with astringents and antiseptics had considerably alleviated matters, but the discharge never ceased completely; and as after a long course of tonics and good dietary she was perceptibly growing thinner, it was decided to operate and remove the uterus and ovaries.

This was done on November 10, the bitch being under the influence of morphia and the abdomen painted with tincture of iodine without any preliminary washing. The internal muscles were united with catgut and the edges of the skin with silkworm gut.

Nothing untoward was observed until about 11.30 p.m. on the evening of the 19th, when the nurse in whose care the animal was placed observed that the bitch was uncomfortable and that something protruded from the wound. This, upon closer examination, proved to be omentum, and from its congested appearance I judged that it had been extruded for at least an hour and probably more. With all possible speed and care the animal was placed upon the operating table in the dorsal position and carefully examined. It was found that one of the internal catgut ligatures had given way and that the omentum had escaped at this place. The protruding portion was carefully excised with scissors and the stump returned, the muscles being resutured with boiled silk. The skin was again sutured with silkworm gut, and the whole, after being dressed with iodine, fixed tightly with an antiseptic cotton-wool pad and a bandage.

The wound was redressed with tincture of iodine every day and rebandaged, the recovery being absolutely uninterrupted.

The patient went out of hospital on the 24th apparently none the worse for her experience.

Reviews.

The Veterinary News. A weekly journal of British and Foreign Veterinary Medicine, Surgery, and Sanitary Science. Price 10s. 6d. per annum, post free. Published by Messrs. Baillière, Tindall and Cox, Covent Garden, W.C.

The December 13 issue is intended as a specimen copy of the manner in which *The Veterinary News* will be conducted during the forthcoming year, and the standard set by the editorial

staff and publishers is a very high one. All branches of the profession will be catered for, and the practitioner, the Army, the municipal services, and our colleagues abroad, will each find something of interest to illustrate the advances veterinary science is making.

The newly arranged editorial staff is a strong combination of talent, each being a specialist in the respective branch of which he has been given control, and from the letter which has been issued to the profession it can also be seen that the publishers and their managing staff are also determined to give the paper every support.

Established a few years ago merely as a pamphlet of a few pages under the editorship of the late Colonel Nunn, *The Veterinary News* has weathered the storm which all new ventures of this kind must of necessity pass through and may now be said to be firmly established as an impartial weekly paper, whose sole aim is to advance the welfare of the profession and to keep its readers up to date in the work which is being done, not only in England but in every part of the civilized world. Some twenty pages are entirely given up to professional matters, and advertisements of instruments, books, drugs, practices for sale, and assistantships vacant make up a further eight pages, the whole being a distinct adjunct to veterinary journalism.

"Our Dogs" Christmas Number. Price 6d. Published by *Our Dogs* Printing Office, Manchester.

The Christmas Annual of *Our Dogs* is the most wonderful sixpennyworth which is ever issued to the canine world, and this year it has (if possible) beaten its predecessors. To the canine practitioner it is indispensable, and, indeed, every veterinary surgeon ought to possess a copy, not merely to read and throw away, but as a work of reference. Within its voluminous pages are hundreds of photographs of the best dogs in Great Britain (which means the best in the world) and their owners, with full description of their kennels and methods of breeding and showing.

The great success which such a paper as *Our Dogs* has attained is a still further stimulus to the members of our profession to devote more and more time to the ailments of their canine patients.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editors.

Manuscript—preferably type-written—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.

THE
VETERINARY JOURNAL

FEBRUARY, 1914.

Editorial.

THE TRANSMISSION OF MANGE FROM ANIMALS
TO MAN.

THAT "mange" is transmissible from animals to man is a fact which cannot be too well known, and a further instance given on a later page is worth drawing attention to. Medical men are not always acquainted with the fact that there may be some connection between an irritable skin complaint in human patients and an itchy dog, and a consultation with a veterinary confrère may often help to enlighten them.

It is not only the dog which is likely to prove an offender, but the horse and others of our patients may transmit the parasite, too.

Since mange in horses has become a notifiable disease, the statistics reported each week to the Board of Agriculture show that the disease is one which is indeed very prevalent, and it was quite time that stringent measures were adopted to counteract its spread.

Mange in dogs ought also to be notifiable, as it is the second most contagious disease (distemper having the first place) of these animals, and legislation for the dog is sure to follow sooner or later on much the same lines as at present for the larger animals,

for their intimate contact with man's household and the incontestable proof of their being the carriers of disease ought to make the regulations for the control over disease in them of at least equal importance to those which are merely used as beasts of burden.

THE UP-TO-DATE AIDS TO VETERINARY DIAGNOSIS.

It is interesting to consider what advantages the present-day practitioner has over his predecessor of fifty years ago, and it is also interesting to note how eager he always is to take advantage of them. The use of cocaine as a diagnostic agent in certain forms of lameness and the value of the Röntgen rays, especially for the smaller animals, together with modern ideas of asepsis, have altogether done away with many doubtful points in making a diagnosis, and have converted a hesitating opinion into a certainty.

The numbers of cases over which one went to work almost in a blindfold fashion are diminishing rapidly, and we are able now to diagnose with certainty in instances where one could only surmise before.

The advantage of a correct diagnosis is too obviously apparent, and it is in improvements in this direction that vast strides have been, and will still be, made. The treatment must, of course, share equally in importance from the practitioner's point of view, but in the absence of a correct diagnosis it is often futile.

There is room, however, for a more extended use of our opportunities, and it would help our profession forward with enormous strides if only more written records could be obtained. Mistakes, as well as successes, recorded in the clinical columns of the various professional journals would not only benefit the suffering animal world, but be of incalculable value to the writer himself as well as to his professional brethren.

General Articles.

A REPORT ON FOOT-AND-MOUTH DISEASE IN IRELAND IN 1912 TO THE DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

(Abstracted.)

(Continued from p. 23.)

IN order to test more fully the view that this affection was not foot-and-mouth disease, experiments were made on other animals with material taken from the mouths of the cattle at Luggyvallen and Loughgall. These experiments resulted in the production of the same conditions in the mouths of some of the inoculated cattle, but no foot-and-mouth disease lesions, nor any constitutional disturbance, resulted. Having regard to the fact that foot-and-mouth disease is an eruptive fever characterized by the production of vesicles, it is significant that no fever was produced and no vesicles formed in any animals during the experiments, and further, that sheep and pigs experimented on did not react.

It is important also to note that on January 1 a veterinary inspector of the Board of Agriculture and Fisheries visited Armagh and saw some of the affected cattle. He expressed the opinion that the conditions appearing in these animals were not those of foot-and-mouth disease.

Further light as to the nature of the disease affecting these cattle came from statements made by local veterinary surgeons who had been for a considerable time extensively in practice in the north of Ireland. Three of these gentlemen stated (and the fact was confirmed by one of the Department's inspectors who had before his appointment been in practice in the north) that they had for years met with this condition in cattle, and that, so far from being regarded as foot-and-mouth disease, it was looked upon as an ailment of so trivial a nature that veterinary aid was seldom sought in connection with it.

Total Prohibition of Landing in Great Britain.

On the discovery of foot-and-mouth disease in Liverpool amongst animals of Irish origin, the Board of Agriculture and

Fisheries immediately prohibited, by an Order dated June 28, the landing at any port or place in Great Britain of cattle, sheep, goats or swine brought from Ireland. The Department had themselves taken a similar prohibitive step as regards landing in Ireland of animals from Great Britain, on June 24, on receipt of intimation of an outbreak of the disease at Penrith, in Cumberland. This action was followed by both Departments by a prohibition of the landing of hay and straw. For some time, therefore, all movements of animals between Great Britain and Ireland were suspended, and for a much longer period—extending to upwards of seven months—all movements of hay and straw between the two countries were stopped. But in the case of the export of animals from Ireland to the British markets, on which the cattle trade of this country so greatly depends, so extreme a course as the total stoppage of the export trade could only be justified as a temporary expedient. This fact was recognized by the British authorities as well as in Ireland, and consequently, before any long period had elapsed, arrangements for a partial resumption of the live-stock traffic from Ireland to Great Britain came under consideration. These arrangements were pursued throughout the whole period of foot-and-mouth disease in Ireland, and though the entire question assumed before long a complex and difficult character, it was found possible to maintain, with some temporary interruptions, a gradually widening system, modified and adjusted to meet the shifting conditions of the time. A brief review now follows of the successive steps in the progress of these dispositions.

*The British Board's "Animals (Landing from Ireland)
Order of 1913."*

The arrangements for shipment of Irish animals to Great Britain have, so far as landing and movement on arrival there are concerned, since been co-ordinated and incorporated in a single Order of the Board of Agriculture and Fisheries—the Animals (Landing from Ireland) Order of 1913—which came into force on January 30.* This Order provides for the shipment of animals from all the customary cattle shipping ports in Ireland to special landing places in Great Britain defined by

* This Order has since been modified by a further Order of the Board, which came into operation on June 7, 1913. In accordance with the latter Order, the period of detention has been reduced to ten hours, and three additional landing places have been provided, viz., Barrow-in-Furness, Heysham, and Fishguard.

Orders of the Board, and set apart specifically as landing places for Irish animals. These landing places are situate at the ports of Birkenhead, Manchester, Holyhead, Fleetwood, Bristol (two landing places), Cardiff, Deptford, Glasgow, Ayr and Dundee. The shipment of sheep and swine for store purposes as well as cattle is permitted under this Order. On arrival at a landing place the animals are detained under veterinary observation for the prescribed period of twelve hours, which is reckoned from the time of landing of the last animal of the cargo, and during this period they are kept from contact with all other animals. A proper and sufficient supply of food and water is required to be provided by the occupier of the landing place for the use of the animals during detention. The occupier is entitled to charge the owners for food supplied, at rates fixed by the Board. After the animals have been discharged they must again be supplied by the owners or consignees with sufficient food and water. The Order lays down the procedure to be adopted in case of discovery of cattle-plague, pleuro-pneumonia, foot-and-mouth disease, or sheep-pox, in animals at a landing place, and rules are also prescribed to govern cases of sheep-scab and anthrax. The Order also contains regulations regarding disinfection of the landing place, and of persons and clothes.

Swine exported from Ireland are, in addition to the provisions of the Order, subject to compliance with the Board's Swine Fever (Movement from Ireland) Orders of 1904 and 1906.

SUCCESS OF DEPARTMENT'S MEASURES IN PREVENTING SPREAD OF DISEASE TO GREAT BRITAIN.

In connection with this matter of the varying arrangements for the shipment of Irish cattle to Great Britain, one significant fact is worthy of special notice. During the period of foot-and-mouth disease in Ireland, that is to say the last six months of 1912, 690,860 ruminant animals and swine were exported from this country to Great Britain. But in no single instance amongst all these thousands of animals was a genuine or established case of foot-and-mouth disease found at any British port. This striking circumstance bears strong testimony to the thorough effectiveness of the Department's measures for confining the disease within the scheduled areas, and preventing the spread of contagion to other parts of Ireland or to Great Britain.

THE COST TO THE STATE OF THE FOOT-AND-MOUTH DISEASE
OPERATIONS.

The varied activities which fell to the Department in combating and eradicating foot-and-mouth disease cast a very considerable expenditure on the Department's funds. The sum provided in the original estimates for the year 1912-13, laid before Parliament, to meet expenditure—other than on swine-fever work—incurred in carrying out the provisions of the Diseases of Animals Acts, was the normal one of £200 only. It may be mentioned that in cases where expenditure is of a widely fluctuating character, such as that for foot-and-mouth disease, and of a kind where it is impossible to foresee, at the time when the original estimates are framed, whether any expenditure whatever may be incurred, it is the practice of the Treasury to insert only a token provision in the original estimate.

It accordingly became necessary to obtain a supplementary estimate in January last to cover the net expenditure incurred. The gross expenditure at that time amounted to £45,500. The sale of carcases fit for food had realized £7,300. Deducting this amount from the gross expenditure, and deducting also the token provision of £200 in the original estimate, a balance of £38,000 remained, which was provided by means of a Supplementary Estimate.

The gross expenditure to March 31, 1913, was £46,841. The sale of carcases of slaughtered animals fit for food realized £7,326, and miscellaneous receipts amounted to £77, leaving the net expenditure £39,438. The expenditure of £1,238 in excess of the £38,200 provided in the Parliamentary vote was met from the General Cattle Diseases Fund.

The principal items making up the gross expenditure of £46,841 were:—

Remuneration of <i>additional</i> veterinary inspection staff, numbering thirty, and of local veterinary inspectors employed	£5,427
Travelling and maintenance expenses	6,824
Cost of slaughter of animals, burial, disinfection, liming of lands, dressing of carcases fit for food, cartage, and other miscellaneous expenses	6,410
Compensation to owners of slaughtered animals ...	28,030
Overtime of temporary clerks, messengers, &c. ...	150
	£46,841

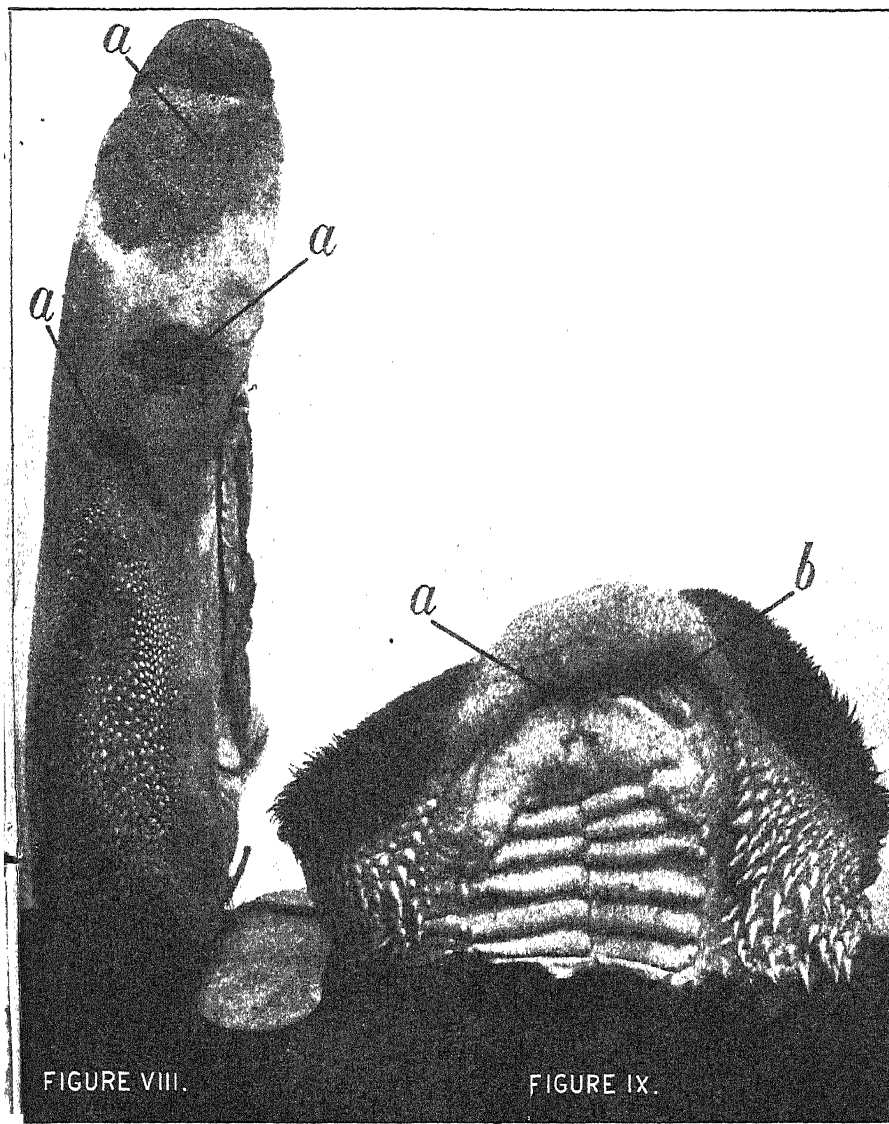


FIGURE VIII.

FIGURE IX.

Tongue of bullock with foot-and-mouth disease. *a, a, a*, erosions of mucous membrane after rupture of vesicles.

Upper lip, dental pad, and part of palate of bullock with foot-and-mouth disease. *a*, erosion of skin on border of lip after rupture of vesicle. *b*, recently ruptured vesicle on inner surface of lip, with epithelium still adhering. (Group No. 3.)

APPENDIX A.

REPORT OF MR. D. S. PRENTICE, M.R.C.V.S., CHIEF VETERINARY INSPECTOR.

In considering the circumstances connected with the recent series of outbreaks of foot-and-mouth disease in Ireland, and having regard to the fact that the disease appeared in sixty-eight places within a period extending from June 30 to November 7, 1912, it would seem convenient for the purpose of reference to group these places according to the counties in which the disease occurred and the dates when the outbreaks were discovered, each infected place being regarded as a separate outbreak.

In dealing with the disease as it arose at each centre the duties cast upon the veterinary staff were exceptionally heavy, a distinct and separate staff of inspectors being employed for each of the following purposes:—

(a) The carrying out of measures so far as infected places alone were concerned.

(b) The inspection and recording of animals on farms, &c., in the vicinity of infected places, as well as the tracing and examination of live-stock moved to other districts before the imposition of restrictions in the neighbourhood in which the disease appeared.

(c) The inspection of animals concerned in the necessary movement of live-stock on licence within or into the scheduled districts, and

(d) In the case of Group No. 1 (County Dublin, &c.) the *post-mortem* examinations of animals in public abattoirs and slaughter-houses.

GROUP NO. 1.

Number of infected places	...	...	...	...	21
Number of animals affected with foot-and-mouth disease	...	...	...	215 cattle, 1 sheep	
Number of animals (including diseased) slaughtered,				1,257 cattle, 1,081 sheep, 26 swine, and 16 goats.	

The initial outbreak of foot-and-mouth disease in Ireland was discovered at Drynam, near Swords, on June 30, by one of the Department's veterinary inspectors, among a lot of forty-five cattle. Twenty-four of these animals were found to exhibit

well marked clinical symptoms of foot-and-mouth disease, salivation, smacking of the lips and lameness being noticeable features. The disease was evidently well established on the farm, and had, it appears, been mistaken for actinomycosis (timber tongue).

In this outbreak the affection was of a comparatively benign character. In some instances the fever stage of the disease had passed at the time of discovery, but lesions on the tongue, lips and feet of cattle were observable in different degrees of progression. These conditions ranged from newly formed and recently ruptured vesicles with the inflamed corium exposed (the epithelium in some instances still clinging to the edges of the raw surface) to rapidly healing lesions. The diseased cattle, in addition to the in-contact animals, were slaughtered without delay, and upon *post-mortem* examination further indications of the malady were observed in twelve others, making a total of thirty-six affected animals out of a herd of forty-five cattle.

On the day following the discovery of the disease at Drynam further cases were reported and confirmed on lands within a mile distant from the first outbreak, and from that date onwards outbreaks occurred at intervals on farms in the vicinity until August 14, when the disease appeared on the seventeenth separate infected place. These outbreaks were no doubt of a secondary character. The district around Swords comprises extensive grazing lands which at the time were especially well stocked with animals, and the disease probably spread from farm to farm owing to their contiguity to each other or to the movement of persons from places before the affection was discovered thereon.

Eleven of the outbreaks were brought under notice for the first time by the Department's veterinary inspectors when examining live-stock on the farms throughout the district; but while this was the case there were, on the whole, little grounds to consider that any desire existed on the part of owners of animals to conceal the disease when it appeared among their herds. In the case of two of the outlying places in the County of Meath where the disease was found to exist, local veterinary surgeons were first called in by the owners to examine suspected cattle, and, after arranging for precautionary measures, they communicated the facts to the Department. In the remaining instance in Meath where the disease appeared, and also in the

case of the County Louth outbreak, the owners of the cattle reported the existence of the disease in the usual way, measures being taken to isolate the affected animals awaiting the decision of the Department.

A large staff of the Department's veterinary inspectors were constantly employed in examining the animals on the farms for a few miles around Swords, and in the neighbourhood of the infected places in Meath and Louth, with a view to detecting the first appearance of disease on the lands, and in order that means might at once be taken to deal with any extension of the outbreak. This procedure, together with the prompt and stringent measures adopted at places known to be already infected, resulted in preventing the outbreak extending more rapidly than it did among the numerous herds of animals in the district.

The movements of animals from farm to farm were prohibited by special service of restriction notices, and a record was kept which would at once lead to the discovery of any animals taken from or added to these places; and while no general slaughter of all suspected animals at the infected centres took place, the slaughter of the affected cattle, and those in contact which it was considered would most likely become diseased, was promptly carried into effect.

The thorough cleansing and disinfection of all premises where the disease existed, and the disinfection of all persons or things likely to convey infection, were rigidly enforced. Large quantities of hay and straw in stacks were on a number of the infected places, and, in a number of instances, it would appear that diseased animals had been in contact with them. The hay and straw were disinfected without damage by a special process of super-heated steam.

The disease varied in severity in these outbreaks. In some of the affected herds mouth lesions alone were noticeable, and the constitutional symptoms were on the whole not severe. In other instances, however, especially where milch cows were concerned, the disease assumed an aggravated character, the invasion usually was rapid, erosions and other characteristic lesions were extensively noticeable on the mouths, feet, udders and teats (in milch cows), and the animals were reduced to a state of prostration.

GROUP No. 2.

Number of infected places	...	...	...	...	5
Number of animals affected with foot-and-mouth disease	...	...	...	...	13 cattle
Number of animals (including diseased) slaughtered,	66 cattle, 31 swine, 6 goats.				

The initial outbreak of foot-and-mouth disease in this Group was discovered at Corravehy by the local veterinary inspector in the course of his practice, and confirmed on August 28 by the Department's officers. Two cattle in the herd were affected, and these with the in-contact animals were slaughtered. The first of the animals found to be diseased was a cow which had recently been to a bull in the neighbourhood, and in tracing the movements of other cows that had also been with this bull, three further cases of foot-and-mouth disease were discovered by the Department's inspectors on another farm in the district. Five additional cases occurred on the farm where the bull was located, and upon all animals on the place being slaughtered, the tongue of the bull was noticed to have a healed lesion such as would result from foot-and-mouth disease.

Two further outbreaks of the disease were discovered in the district, one of which was reported by the owner, the other being found by a Departmental Veterinary Inspector when examining animals in the neighbourhood.

The disease as it appeared in this district was of a comparatively mild type. In the case of all the affected animals tongue lesions of the disease were present in one stage or another. When seen by the veterinary inspectors, the constitutional symptoms had mostly subsided, but salivation was especially noticeable. The country where these outbreaks occurred consisted of small farms, and the animals grazing thereon were comparatively few in number. The farms in the neighbourhood of the infected places were constantly visited during the period of restrictions by veterinary inspectors of the Department, with a view to the early detection of any case of the disease which might appear in animals thereon, and, in order that a check might exist on the possible movement of live-stock from or on to any of these farms, the usual records of animals found on each place were maintained.

Thorough cleansing and disinfection of each infected place (as far as was practicable) and the disinfection of all persons and things likely to convey the disease, was carried out under the supervision of the Department's officers.

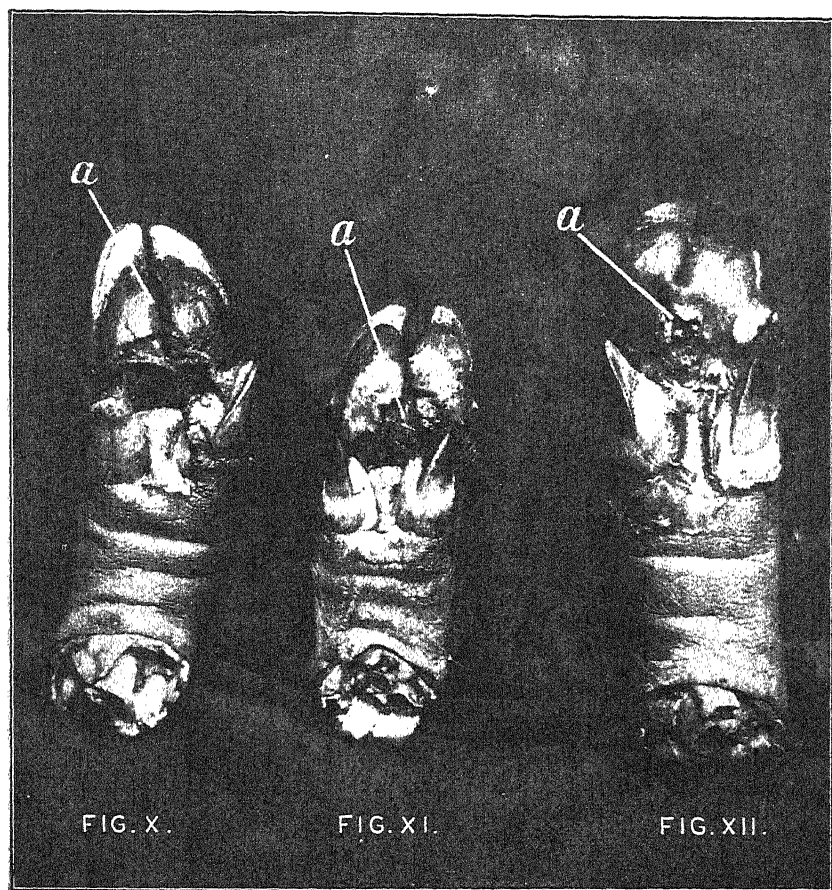
There is nothing to indicate how the disease was in the first instance brought into this district. The different outbreaks were, however, doubtless connected with each other. Most of the infected farms were comparatively near to one another, and considerable movement of live-stock had taken place in the vicinity before the initial outbreak was discovered.

GROUP NO. 3.

Number of infected places	...	...	...	...	5
Number of animals affected with foot-and-mouth disease	...	...	...	26 cattle, 14 swine.	
Number of animals (including diseased) slaughtered,				172 cattle, 137 sheep, 24 swine.	

The initial outbreak of foot-and-mouth disease in this Group occurred at Ballysax, County Kildare, and was brought under official notice through the agency of a local veterinary surgeon, who was called in by the owner to examine sick animals on the place. The disease was confirmed by Departmental officers on August 28. In all eight cattle and fourteen swine were found to be affected, and were slaughtered. The remaining animals on the farm, consisting of 17 cattle, 122 sheep, and 8 swine, were also slaughtered, it being considered likely that the disease would extend to them.

On September 2 a report was received that a bullock was suspected to be affected with foot-and-mouth disease at Kinneagh, a farm adjacent to Ballysax. The existence of the disease on this place was at once confirmed. There were ninety-seven other cattle grazing on the farm, belonging to upwards of twenty different owners, and it was necessary to consider whether the circumstances were such that the disease would probably extend to any or all of these animals, but in the meantime measures were taken to isolate the herd as far as was practicable. On September 6, however, another bullock on the place showed lesions of the disease, and it was determined to slaughter the entire lot of animals on the farm. At the date of slaughter fifteen cattle in all were attacked.



Back view of feet of swine affected with foot-and-mouth disease. *a, a, a*, ruptured vesicles.
(Group No. 3.)

From Kinneagh the disease spread to an adjoining farm at Sunnyhill, where one bullock was found to be affected and was forthwith killed. On this farm and on adjoining land thirty-five other cattle and eleven sheep grazed. All of these animals were, as a precautionary measure, slaughtered without delay.

The disease also appeared at Lugatryna and Dunlavin Upper, in the County of Wicklow, distant about six miles from the County Kildare outbreaks. At Lugatryna the outbreak was reported by the owner and confirmed by the Department's officers, and at Dunlavin Upper the disease was discovered by one of the Department's inspectors when examining live-stock on farms, the affected and in-contact animals being slaughtered.

The disease in County Kildare assumed a somewhat severe type; the constitutional symptoms observable were well marked, and in many instances lesions of the affection were found on the tongues, lips and feet of the animals attacked.

In the case of the swine at Ballysax vesicular lesions on the lips and feet were exhibited. The animals were in a distressful condition, and at the time of slaughter the horny parts of the feet of some of them had sloughed off.

The cleansing and disinfection at infected places in this Group, as in other cases, was (as far as was practicable) carried out in a thorough manner, under the supervision of the Department's inspectors.

The proximity of the Kildare outbreaks to the extensive Curragh grazing lands, on which thousands of sheep were grazing at the time, was a constant source of anxiety to the Department. These sheep were placed under special restrictions, and inspectors were continually engaged in inspecting them, as well as other animals in the neighbourhood, fearing the possibility of further extensions of the outbreak. Fortunately, however, the disease did not extend to the Curragh grazing lands.

As in the case of other outbreaks of foot-and-mouth disease, a number of theories were put forward respecting the manner in which disease was originally conveyed to Ballysax. These on investigation were proved to be unfounded. One of these theories, as related to the Department, was to the effect that the swine at Ballysax had been bedded with straw which reached the Curragh Camp as packing material for certain goods, and

it was assumed that this straw might be of foreign origin. It was ascertained that no straw from the Camp was brought to Ballysax; but from inquiries which were instituted it would appear that the swine had been fed on swill from the Camp, and from this fact the rumour as to the straw would seem to have gained currency. Further, it was learned that any vegetables mixed in the swill were of Irish origin. A number of other persons around the district had also fed swine on swill from the Curragh Camp. These animals were carefully examined, without the discovery of any trace of disease.

From Ballysax the disease was evidently conveyed to Kinneagh and the adjoining infected place at Sunnyhill. Passing from the Ballysax direction there are footpaths through Kinneagh, which are constantly used by pedestrians, and it is probable that the infection was conveyed to Kinneagh in this manner before the discovery of the Ballysax outbreak.

There is nothing to show how the disease was conveyed to Lugatryna and Dunlavin Upper.

GROUP NO. 4.

Number of infected places	...	...	...	...	37
Number of animals affected with foot-and-mouth disease	...	...	...	112 cattle, 1 swine.	
Number of animals (including diseased) slaughtered,				426 cattle, 315 sheep, 19 swine, 9 goats.	

The initial case of foot-and-mouth disease in this Group occurred in the town of Mullingar. On October 18 a local veterinary surgeon reported to the Department that he suspected the existence of the disease in Mullingar, and on the same date outbreaks were confirmed by the Department's veterinary inspectors on five different places in and adjoining the town. On the following day six other outbreaks were confirmed in the neighbourhood, and the disease spread with more or less rapidity until November 7, when the thirty-seventh outbreak was reached, but by that time the disease was well under control.

All of the places infected were within a radius of about four miles from Mullingar, and, with the exception of one or two instances, the disease did not spread beyond a mile from the town. Owing, however, to the rapidity with which the infection did extend, these outbreaks were calculated to cause greater

alarm than any of the preceding ones in Ireland during the year.

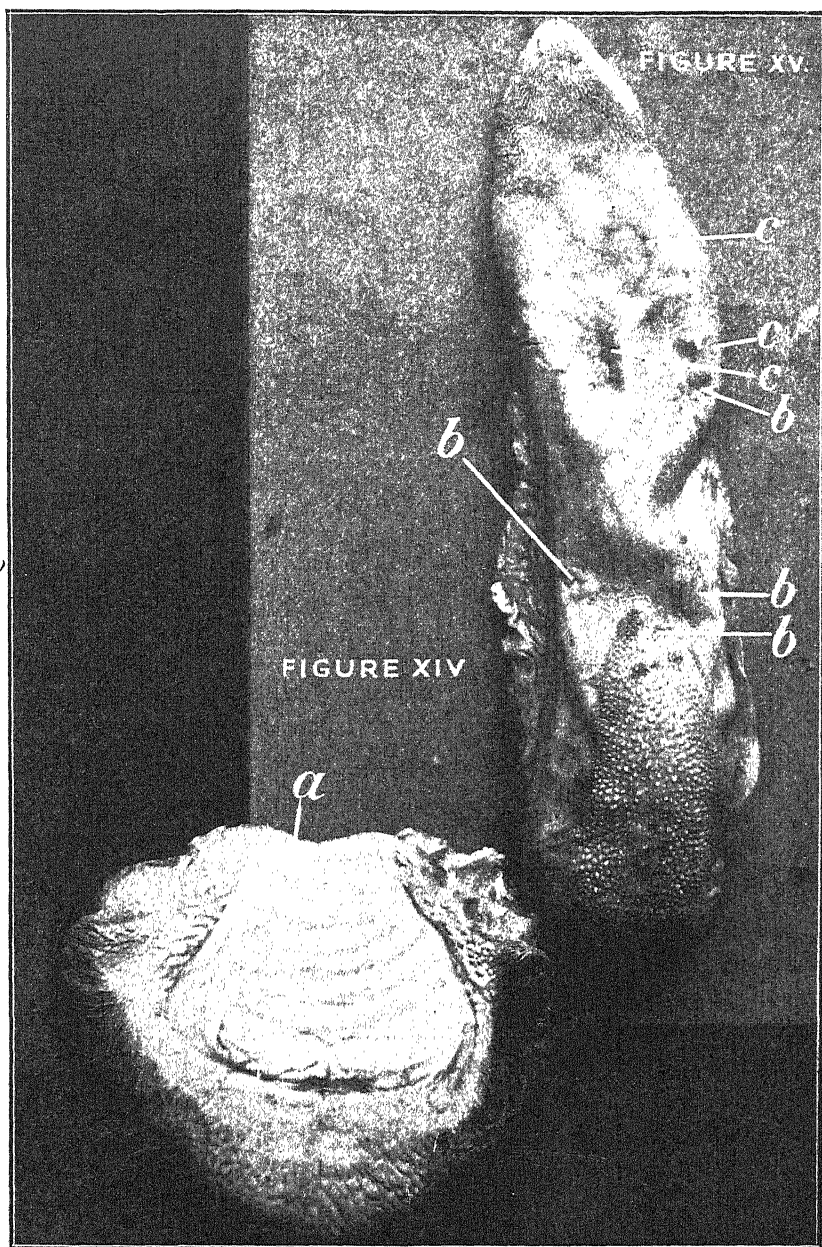
It is probable that the disease existed for a few days about Mullingar before being actually recognized and brought under official notice. The history of some of the earlier cases in the vicinity of the town, as subsequently ascertained, and the condition of the lesions observed on certain of the affected cattle, tend to corroborate this view.

The rapid manner in which the disease extended in the earlier days of its invasion is attributable to the fact that residents in Mullingar, owning small lots of cattle, including milch cows, moved some of them daily from the byres situated in the town, along the public streets to the town parks, where the animals grazed. By these means cattle housed in different portions of the town were in frequent contact with each other, or passed over the thoroughfares about the same time each day; and it has been ascertained that some of the animals so moved were actually at the time the subject of the disease in its early stages. The grazing lands were in a number of instances contiguous to each other, and the infection spread from herd to herd owing to this cause also, and possibly in some cases by the movement of persons from places where the affection was subsequently found to exist.

With one exception it was considered necessary in the case of each infected place to slaughter all susceptible animals thereon—non-infected as well as diseased—and also certain other animals in proximity to some of the infected places.

A special feature of this outbreak was the number of different lots of cattle which it was ascertained had been moved to other districts from the neighbourhood of Mullingar immediately before the outbreak was discovered. These were, however, followed up, examined, and placed under restrictions. It was considered necessary as a precautionary measure to slaughter certain of these animals which, it was ascertained, had been moved from the immediate vicinity of infected places about Mullingar. In all instances, however, no disease was discovered amongst these cattle.

An unusually large staff of inspectors was employed in connection with these outbreaks, owing to the number of infected places which required to be dealt with at the same time, and the



(NEWRY-BIRKENHEAD CASE.)

Dental pad and lip of bullock and tongue of same bullock shipped from Newry to Birkenhead on December 3, 1912.

a, part of dental pad and lip from which a thin layer of superficial epithelium has been removed.

b, brown-coloured markings (centres from which layers of superficial epithelium commence to peel off). *c*, superficial epithelium commencing to peel off tongue.

(Tongue shrunken and distorted owing to preservative.)

extended area in which farm-to-farm inspections of live-stock were made. During these latter operations seven of the outbreaks were discovered by the veterinary inspectors.

Taken as a whole the disease may be regarded as of a severe type. The characteristic appearances of the malady were present in the case of all the affected cattle, and were especially noticeable where milch cows were attacked. The constitutional symptoms were frequently of an aggravated character. A large number of the animals exhibited lesions on the feet as well as on the tongues and lips, and, in the case of milch cows, on the udders and teats. In some instances the lesions were abundant on the parts concerned.

None of the sheep on the infected places contracted the disease.

The cleansing and disinfection of the infected places was carried out as thoroughly as possible by the veterinary inspection staff.

No evidence has been obtained which would show how the disease was conveyed in the first instance to Mullingar, but there is no doubt that all the thirty-seven outbreaks were directly or indirectly connected with one another.

In addition to the live-stock concerned in the outbreaks of foot-and-mouth disease, no less than 378 animals suspected of the disease in different parts of the country came under notice of the Department's veterinary officers within the period from July 1 to March 1. On examination and investigation all of these animals proved to be free from foot-and-mouth disease. The large majority of these suspected cases were easy of diagnosis, but difficulties arose in some instances, and it may be interesting here to refer to a few cases of this kind discovered at or in connection with the cattle shipping ports.

On November 28 a large consignment of store cattle were being inspected at Dublin port preparatory to their shipment to Dundee. Among these animals were a lot of eighty bullocks which for some months previously had grazed together on lands in the County of Meath. On being "mouthed," a lesion was discovered on the surface (near the tip) of the tongue of a bullock. The mucous membrane had been removed to the extent of about an inch square, and, when discovered, the abraded surface was in a semi-healed condition. There were no feet lesions. Except

for the condition of the tongue the animal was in a perfectly normal state of health. The abrasion on the tongue would not have been discovered had not the bullock's mouth been opened during the process of examination. The appearance of the tongue simulated that which might possibly result in the case of an animal which was affected with foot-and-mouth disease and had passed the infective stage of that malady. A searching examination was made of the remaining bullocks of the lot, and of other animals in the inspection yard, but nothing further of a suspicious character was discovered.

No case of foot-and-mouth disease had occurred in the district from which the bullocks had been moved prior to their arrival at the port for shipment, and it would appear that nothing abnormal had previously been observed in respect to this animal, or other animals comprising the lot. The length of time the lesion must have existed, the period the cattle had grazed together, and the absolute freedom of all the companions of the bullock from any appearance of disease whatever, strongly discredited the suspicion that the abrasion observed on the tongue of this otherwise healthy animal was due to foot-and-mouth disease, and, upon a decision being arrived at that the condition had arisen from a cause other than foot-and-mouth disease, and the owner having expressed his willingness to slaughter the bullock and hand over its tongue to the Department, the cargo of 486 cattle was allowed to proceed to Dundee. Immediate steps were taken, however, to inspect all the animals in or about the farm in the County of Meath from which the bullock came, but no appearance of disease was found, and nothing was elicited which would tend to indicate that any sickness for which foot-and-mouth disease might be mistaken had occurred in the vicinity.

(To be continued.)

DIET DEFICIENCY AND DISEASE IN LIVE STOCK.*

By FRAS. EVELYN PLACE, B.Sc., M.R.A.S.E., B.V.Sc., M.R.C.V.S.,
M.R.I.P.H., &c.

Veterinary Lecturer to the Department of Agriculture, South Australia.

GENTLEMEN,—Highly as I esteem the honour of being invited to submit a paper before such a learned and erudite body as the Australasian Association for the Advancement of Science, and much as I appreciate the opportunity held out by that body to enable the veterinary surgeons of the Commonwealth and Dominion to foregather under the ægis of its patronage, I feel that, as a comparatively new-comer, I should more fittingly assume the rôle of a postulant at the feet of such Gamaliels than take upon me the robe of a teacher, and it is in this frame of mind that I venture to occupy your attention for a short while with some of the aspects presented by the connection between diet deficiency and disease in live stock. Some of the phenomena attracted my attention many years ago during dry summers upon the moors of Devon, but during the Indian famine of 1904-5 I began to collate certain symptoms and to assign to them in my own mind a chemico-physiological importance in the conditions which prevailed among the live stock in the famine-stricken desert of Rajputana; and upon my arrival in Australia some three years ago I found in Victoria and South Australia that the minds of stockowners were being exercised over similar if not identical problems, quaintly named in the latter State "Dry Bible" and "Coasting," while Tasmania and New Zealand meet with trouble possibly more akin to the English forms in "Midland Disease" and "Bush Sickness," and South Africa joins in with Lam and Stieffziekte; and in the face of all of them the veterinary profession has unfortunately to admit its ignorance of the causative factors and has to adopt empirical remedies, such as bone meal, and to endure a certain amount of scorn from the ignorant and unscientific who know all about it, while the profession is still delving amid the mass of contradictory reports and confusing symptoms in an earnest, and I hope soon to be successful, endeavour to elucidate the reason of phenomena noticed.

If I may be allowed, I would revert for a few moments to a number of diseases which affect ourselves, and which I may

* A paper read before the Australasian Association for the Advancement of Science, Veterinary Section, Melbourne, 1913.

refer to as belonging to groups, such as the beriberi, the scurvy and the pellagra groups, and which are recognized by a large and increasing number of scientists as yielding to suitable diet; and I would class myself among the believers that they are caused by deficiency of certain food elements, the absence of which has a marked and serious effect upon tissue metabolism in nerve, muscle and bone; a group of organs which compose about 60 per cent. of the bodies of our domestic animals, and which hitherto have received more attention from the breeder of live stock than from the veterinary surgeon, if we omit those which build up the legs of a horse, in which the Psalmist warns up not to put our trust, plainly with prophetic vision foreseeing the advent of motor traction and its effects upon the income of the veterinary practitioner.

For a moment I will briefly sketch the symptoms of beriberi as I have seen them occurring in some poor wretch who has vainly been endeavouring to keep body and soul together upon a handful of mouldy, weevilly rice, and then I will try and draw a parallel from a horse dying in the ninety-mile desert.

The patient loses weight till he is reduced to a skeleton; œdema, contractions, paralysis and anæsthesia of the limbs, marked nervous symptoms, due apparently to degeneration of the peripheral nerves and those of the heart muscle, followed by death or recovery without any treatment beyond a change of locale, with most probably important additions to the defective diet. So much for the human animal, now for the equine. The collar grows too large, fresh holes have to be punched in the girths, the legs swell and the spur vein fills, he trips and totters, and without notice collapses on the sand without a groan or struggle, with spume at the nostrils and nought but hide upon his ribs.

Or look for a moment at a case of scurvy, with its anæmia and cachexia, its local hæmorrhages and hæmorrhagic inflammation, the spots upon the ribs, their dislocation from the cartilages, with perhaps neuritis and anæsthesia of the limbs, and compare it with a coastly heifer, with her bloodless eyes and bottled jaw, her gaspy breath, due to her ribs failing to distend, her tottering walk and swollen fetlocks, and, finally, her feeble, helpless efforts to control her limbs and raise her wasted carcass.

Is not one justified in asking: Are these mere coincidences,

or is there not a closer connection? For my own part I think there is, and it is interesting to note how veterinary surgeons have accepted and rejected the same theories with regard to this class of disease, as have members of the sister profession, though they have worked apart. Intoxication, auto-intoxication, infection, and even the photodynamic theories, like ancient dynasties, have risen, held their sway and gone, while now the deficiency theory has been hinted at by Theiler, Gilruth and Aston, though but tentatively and as through a glass darkly. For to us the proteid has been a mass, a pyramid viewed in the mist of early dawn, and in the noonday heat its building stones have but afforded us shelter while we slept; their individual characters, their cryptic signs, are still to seek, and perhaps at eventide there shall be light.

The cow, with her hide-bound belly and stiff stretched neck chewing the bones of some less lucky mate, has suggested the want of phosphorus, and kindly consideration has provided a bone meal lick; but is not this significant of a certain amount of rough-and-ready argument forced upon the veterinary surgeon by the pressing need of staying the plague, and is it not characteristic of a certain roughness in feeding experiments which have been carried out? We see the proteid, the carbohydrate, and the fat, the tricolour which proclaims the revolution, but we are deaf to the groans the gabelle raises, we think the miller but dips out a negligible mite, we wonder when red ruin racks our state, we fail to miss the amides of our meadow hay, we ignore the subtle ethers which scarce move our chemists' scale, and wonder when our beast falls never to rise again.

Led by the chemist, whose accuracy far exceeds our own, we have framed standard diets with correct nitrogenous ratios, we have carefully balanced the income and the outgoing—at least in theory—and our American cousins have also in fact, in some careful series of experiments, especially those carried out at Wisconsin, without success. Here in Australia we have no data *re* the composition of our common food-stuffs, we know less about them than we do of the component parts of a German sugar beet or an Indian millet, and our ignorance falls upon our own heads in the nemesis of dry bible and coast. South Australia, at least, is endeavouring to lift the veil of this darkness, but many years must elapse before the observations and experiments now

being carried out at the Agricultural College, Roseworthy, can be finalized, though from time to time parts of them may be available. Up to now we have no Australian analysis of cockie chaff or wheaten hay, our grasses and native clovers are unknown quantities, but when we seek them out we must remember that caloric figures are incomplete records of the value of a food-stuff, and that the innate metabolism of a grain has a physiological value which we cannot weigh or count in figures. In short, that the feeding value of any food is based upon a most complicated chain of factors, each dependent on the other, till the mind becomes dazed at the number of combinations any one series may present.

The appearance of the stock in the dry districts of South Australia leads one to think that a very large amount of feeding value of their forage is expended in maintenance, more than the five-twelfths of Kellner's observations; even those which are keeping their condition give one the impression that too great a proportion of their energy is expended in managing to live; to use a feeder's expression, they have no "bloom," or, in butcher's terms, they "kill light." A somewhat extensive acquaintance with these beasts in the slaughterhouse supports this idea; their musculature is devoid of intermuscular fat, and its water content is far too high proportionately, so they shrivel when they set and resemble biltong more than beef, and when canned their gravy is gelatine rather than jelly.

A high proportion of this class of beast has an acid reaction with the urine, which is also the case in dry bible and in some forms of coast disease, anent which it is interesting to recall the note in Smith's "Physiology": "When the herbivora are starved their urine gives an acid reaction." Now, as physiologists, we must look further than the kidneys and bladder for the origin of this change, and we find it no doubt in the muscles. This is not the place, nor, if it were, would time permit to go into detail as to the chemical changes in the muscles, but it is worth noting that they become strongly acid in reaction when the call upon their endurance is excessive, either as labour or as deficiency in nutriment. In this connection we must call to mind the fact that food deficient in nutriment not only fails to nourish, but also lowers the digestibility of nutritious food fed with it, so that large feeds of straw chaff with a modicum of

inferior wheat, such as form the standard diet of many horses, do not conform to the requirements of their system even when liberally diluted with sand, nor are they calculated to produce meat or milk.

At first glance the analysis of certain straws does not show them to be entirely unsuited for use as food, but wheat straw seldom shines out well, Kellner's figures being: Water, 13·6; nitrogenous substances, 3·3; fat, 1·3; soluble carbohydrates, 39·4; fibre, 37·1; ash, 5·3; with a digestibility of less than a third of its weight.

And this is the diet on which a large proportion of Australian stock are supposed to find their nourishment. For an analysis of wheaten hay we have to go to America, and it is by no means improbable that the analyses made there are those of a fodder differing in many effective elements from the same substance here, but it shows a marked improvement in the nutritive ratio, and reveals the fact that cockie chaff probably saves the situation. It is to be hoped that the Roseworthy experiments and observations will set this matter more clearly before the feeder. The careful study of the analyses of the common fodders in use in Australia is of value, but analysis alone is most misleading; digestibility is a better guide; but assimilation is not synonymous even with this, as the appearance of stock on much country where undoubtedly they are digesting a fair proportion of what they eat clearly shows, for frequently a change to land which does not seem so good brings about an alteration for the better. When dealing with metabolism in the tissues we are dealing with only a limited series of factors; metabolism in the fodder itself while growing, and after cutting and while in store, to say nothing of the natural action of the enzymes of the digestive juices in partnership with those of the fodder, are all issues which have to be studied both alone and in conjunction. In Australasia live stock present the symptoms of the great groups of deficiency diseases observed in man: the beriberi group is typified by the so-called epizootic paralysis and the disease in horses where the collapse is so sudden that death may occur upon a journey without warning, reminding many who went to the war in South Africa of the fatal horse sickness prevalent in that country, whose lam ziekte and stiffziekte have their counterparts here in neat stock as coasting and dry bible. The scurvy group appears in horses, cattle and

sheep in forms widely known, but generally receiving local and often unmeaning names, such as crankums, rheumatoid arthritis, and so on. The pellagra group also have their counterparts in skin and stomach lesions in the central and northern districts of Australia, the midlands of Tasmania, and the north island of New Zealand, a chain of tracts which have in common scarcely any climatic or botanic similarities, which fact almost forces on one the necessity of falling back upon physiological resemblances.

Fagopyrismus in cattle and epizootic paralysis in horses naturally turn the thoughts to the study of the balance of metabolic factors and their influence on the major physiological processes in live stock, because they are instances of the disastrous effect of very slight alterations in those balances. Among physicians one school scoffs at the laboured triturations of the other, which in turn smiles in pity upon the germ bespangled broths and jellies of the other; and both in turn are the sport of yet a third party which, while deriding drugs or sera, agitates the public mind with the desire for frequent change both in venue and diet, to say nothing of habits and thought, and between them Nature waves her wand and produces eggs and cream, lamb chops and Murray cod, strawberries and apples, ale and tea, all just proteids, carbohydrates, fats and water, yet every one distinctly different and pleasing in their variety by their distinctive characters, which are to a great extent amides or amido acids almost negligible from an analyst's point of view, but recognizable by the working bullock that suddenly pulls up to crop some succulent weed by the roadside, or the colt which, browsing by its dam, picks off the dainty tops that please its palate; and even the farmer seeks for them when at this time of year he bemoans the fact that pastures, so good three months ago, are not able to carry the stock now, though, minus the water, the crop upon them is probably, weight for weight, richer in proteids, &c., than it was then.

And here we must pause a moment to consider an important factor which probably has much to do with deficiency in Australian fodder, namely, the fact that plants grown in dry heat are deficient in many of their natural amides, that when present these undergo metabolic changes which render them unadapted to the use of stock—a fact unpleasantly forced upon my notice some few years ago in Burma, by the untimely and numerous deaths of

ponies fed upon *Phaseolus lunatus* and similar legumes grown in a dry district, while lower down in the moister parts the same plants were fed regularly without harm, and I have no doubt that the contradictory reports about soya beans in England arise from the conditions under which they have been grown, in spite of the similarity of the analyses in all such cases.

Recent investigations by the Commonwealth statistician have demonstrated the curious effect upon the birth- and death-rate of varying quantities of moisture in the atmosphere as applied to man, and the practical farmer daily demonstrates the same thing in his movements of stock, while the creek and the waterhole seem to be the determining factors in the utilization of the amides in the fodder illustrated by the saying I heard some thirty years ago in the Riverina, that if the sheep could have a blade of grass one day and a drop of water the next they could weather through the drought, but with the grass alone they could lie down and die.

Research has demonstrated that in the large nerve organs as well as in the peripheral nerves of animals that have starved, or in the polyneuritis of pigeons and in the impaction paralysis of cattle there is a marked deficiency in the normal phosphorus content of those organs, despite the fact that phosphatic content of their food has been ample; and one knows how very disappointing, from a therapeutic point of view, the administration of phosphorus proves to be in many cases, while in others it seems to act like a charm. A series of analyses of the phosphorus contents, both actual and relative, of the otoliths in paralytic stock would probably illuminate the obscurity of many of the symptoms.

When one considers that the caloric energy of bad grass hay, as compared with good grass hay, is very little more than half, and that five-twelfths of the amount of food eaten has to be used for maintenance; also that the wastage of bad hay is double that of good, and that the more inferior the fodder is the greater the depression of digestion; also that when in conjunction with these factors they are all intensified if the water supply is insufficient, one is bound to consider that under some Australian conditions live stock must be chronically upon the verge of starvation, which, as a matter of fact, is just the impression that I gained when first studying these conditions, although an absence of thirteen years from England and an extensive acquaintance with the appearance of stock in India under famine conditions

should have familiarized me with the symptoms of existence under such disadvantages. One notices that when phosphorus is available as when bone meal is given the nerve lesions are minimized, but that the appearances compatible with bloom and health are only restored when natural fodder in an actively growing stage is to be had, unless one makes an exception in the case of stock receiving ensilage, a form of nourishment in which, if the natural amides have undergone change, their place is taken in some degree by ferment products nearly allied to them. In this connection one's mind reverts to the empiric remedies of currants and yeast, the administration of which is undoubtedly followed by a measure of success in this class of disease which cannot fairly be attributed to a merely mechanical action upon the ingesta.

One other point must be called to mind before we commence to collate the clinical facts we have been considering, and that is the frequency with which enlargement of the thyroid is met with in the class of disease under consideration. One finds this in all classes of stock—colts, calves, mares, geldings, cows, and steers—a list which excludes those whose generative organs are immature, or male animals which as a rule are fed with a diet of superior order.

It may be that from a clinical point of view I have not brought forward sufficient evidence to convince many that we are dealing with groups of disease resulting from diet deficiency, that is, deficiency in some essential necessary for the normal physiological processes, diseases that may still be regarded by many as intoxications (a view, I must confess, I still have a hankering after, although my faith in it is daily being undermined by the contradictory and inexact statements which are constantly being put forward with a view to make its position more tenable), but we have the fact that these deficiency diseases break out in countries where a certain unvarying diet is partaken of for long periods, while near by stock seem to be exempt from their attack, due no doubt to some minute alteration in the diet which contains the necessary protective bodies.

As I have already alluded to the similarity in the course of the symptoms I may here merely remark that the most prominent ones are found in all the diseases we are considering, namely, a general cachexia with enormous loss of weight, marked

nervous symptoms due most probably to degeneration of the peripheral nervous system, centripetal rather than eccentric. And roughly we know that all these diseases can be prevented by the addition of certain substances to the food, and in some cases when the disease is not too far advanced a cure may be hoped for.

In the case of human diseases these substances are known to be organic bases, and are termed "vitamines"; those of the beriberi group and the scurvy group being well recognized, and to some extent being interchangeable, though not always. Although veterinary research has not so far gone thus far, veterinary clinical observation, which I believe I may justly claim as being keener than that of the sister profession, has supplied the missing substances in crude form (bone meal, ensilage, cattle spices, and so forth); while the beans always considered necessary for muscular growth and fitness in training stables supply the vitamins in profusion—facts that Gryns and Eykman applied to the treatment and investigation of deficiency diseases, and which Worth and myself experimented with in Burma, finding that the protective substance is soluble in strong alcohol and effective even after this elimination of alcohol soluble proteids. The fact that the phosphorus content of some fodders acted as an index to their harmfulness or otherwise suggested that probably there was a deficiency of certain organic phosphorus compounds in the food which has sufficed for Schauman to construct his phosphorus deficiency theory.

Investigation has proved that the protective substances, whichever they may be, are: Soluble in alcohol, in acidulated alcohol, and water. Dialysable. Destroyed by heating somewhat above 100° C. They are neither salts nor proteins. They are easily destroyed by chemical manipulation, and on this account have most probably escaped the observation of earlier investigators.

Funk concluded that owing to the stability of certain substances from yeast in acid solution these protective substances are probably nitrogenous, of simple chemical nature, and belonging to the group precipitated by phospho-tungstic acid, and tracked them down till he obtained a compound with the formula $C_{17}H_{20}N_2O_7$. The quantity of this substance present is extremely small, 1 kilo yielding only 0.5 grm., and the curative dose was found to be very small indeed, but varying with con-

ditions of nerve degeneration and subsequent diet, resulting in some critics considering the substance to be merely an activator, a member of the group of hormones. Subsequent investigation, however, upsets this theory, and gives rise to another, that neuritic symptoms of starving animals are dependent not only on phosphorus deficiency, but also on nitrogen deficiency in the nerve organs, and that in the absence of the vitamine the organism cannot synthesize its nerve elements, and so deficient metabolism ensues and death results. Here the yeast and currants of the empiric tell.

Vitamine is necessary for the metabolism of the nervous tissue, and its lack forces the animal to take this substance from its own tissues. The result is enormous loss of weight, and when the available stock begins to run short there is a breaking down of the nerve tissue and the resulting symptoms, among which, in the south-eastern parts of South Australia, is the form of epidemic dropsy so reminiscent of the so-called wet beriberi.

I have already drawn the parallel between some forms of "coast" and scurvy, the latter being so prevalent on a diet of starch and preserved food, and yielding so easily to lime-juice and fresh fruit and vegetables, especially onions, as I, after some months on boiled milk and brandy, have reason to be thankful for. The prevalence of scurvy of the gums is responsible for many of the dental troubles which supervene on the attentions of quack horse dentists, and is possibly the reason for the existence of these operators.

One of the symptoms of this form of disease in cattle in South Australia is a blue hyperæmia of the gums, and in some instances ulceration, which have misled me into imagining I had lead poisoning to deal with until undeceived by chemical analysis. In human scurvy only fresh food possesses the protective power; dried material is entirely valueless; but lime-juice apparently is possessed of a greater quantity, and that more stable, and offers a promising therapeutic remedy for stock.

In the process of germination seeds are known to develop all kinds of enzymes in order to utilize their food reserves, and grains, such as oats, develop an anti-scorbutic agent after they have germinated, but they lose this power when they are dried again. This is also true when the process of ripening is not completed, so that the shrivelled wheat in Australian hay is

probably unable to carry on this process, even although its nitrogen content is high.

Infantile scurvy is not uncommon in factory-fed calves and pigs receiving waste milk which has probably been preserved by heat. And although the vitamines in milk is fairly stable it is destroyed by heat, the extent of its destruction depending on two factors: the temperature and length of time of heating. Further factors, says Funk in a passage which is pregnant with importance to Australian dairymen, are: The reaction of the milk, the natural content of vitamines in the cow's milk, which, of course, depends entirely on the content of vitamines in the cow's food, and so far we know nothing about them, except the financial loss such ignorance entails.

All the symptoms of the disease we are considering can be produced in miniature in guinea-pigs: The loss of hair and weight, the paralysis of the hind legs and catarrh of the intestines by a deficient diet, not deficient in quantity but in protective substances. And their blood is sterile, like those other beasts we deal with. The results of modern investigations in deficiency diseases are not well known to physiologists, and are practically unknown to veterinarians, though Mandel and Emil Fischer have long ago forecasted the results at which we are arriving, and have pointed out that these substances protective have been too easily overlooked.

In the metabolism experiments performed with a view of determining the nutritive value of different proteins the question of vitamines has not been considered; but if they are not present, even though the nitrogen content is high, the animal wastes and fails, and in future experiments they must be carefully considered. Abderhalden's experiments in feeding dogs with their own proteins, and his rather too premature conclusion that the question of artificial food is solved, have their value in calling our attention to the length of time an animal can survive upon its own tissues or those closely allied to them, and enable us to understand how the famine cow survives upon dried dung cakes, or the dry bible beast on mummified rabbits that have succumbed to phosphorus in overdoses.

Many years of careful work are still before us before we know much about vitamines and similar protective substances, but my purpose will have been served if by these few observations I have

succeeded in arousing among my professional brethren a fleeting interest in them, for it is quite possible that their importance is much greater than has been hinted at in this paper, and a predisposition to many other diseases may be due to a deficiency in these protective substances.

We shall see the whole importance of these protective bodies when we know for what purpose these small quantities of substances are required in the animal organism. It is obvious that the minute amount necessary cannot be considered from the point of view of food, unless they are the ambrosia and nectar of the ferments and hormones, or the favoured vintages of the internal glands, such as the thyroid and pituitary.

The further investigation of vitamins, the knowledge of their chemical composition, and their fate in the animal body should help to eliminate from veterinary phraseology such classic terms as dry bible, enzootic paraplegia, coasting, and other high- or low-sounding titles which mean nothing, and only serve to raise a smile upon the faces of those who deem we are endeavouring to hide our thoughts in words.

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Clinical Articles.

THE CASTRATION OF ANTELOPES AND SIMILAR SEMI-DOMESTICATED ANIMALS.

By C. A. POWELL, M.R.C.V.S.

Woburn.

WILD or semi-domesticated animals living in a state of nature are castrated in a similar way to large calves on a farm, viz., secure the head either by a noose round the horns, or if these are absent by a noose round the neck with a safety knot tied so that it cannot pull tight enough to cause strangulation. The end of this is then passed around a post or a ring in the manger and the animal's head drawn up tight. A casting rope is then passed round the animal's neck, the ends pulled level, and a noose tied with a figure of eight knot—the latter resting on the top of the withers. Each end of the rope is then passed backwards through and around the hind leg and brought up on the outside, passing under the first line and then under the neck noose. The loop is then dropped on to the heel of each foot and the line on each side pulled tight. The rope securing the head is then loosened sufficiently for the latter to come down on the ground level with the rest of the body. The animal is then pulled down and over on its back and the legs secured by the ordinary method.

Castration is then carried out with the clamp and actual cautery. The scrotum being opened on each side with a knife, the tissues of the testicle, severed from their attachments and stripped for a little distance up the cord. Both cords are then enclosed in the clamps, severed and seared. They are then released, an antiseptic dressing such as a solution of kresophen or chinisol poured in the scrotal cavities, the rope loosened and the animal allowed to rise.

For these operations plenty of strength is necessary, and when the animal is down the operation should be performed as quickly as possible. The vessels of these animals sear very quickly and easily, and according to my experience no after complications occur.

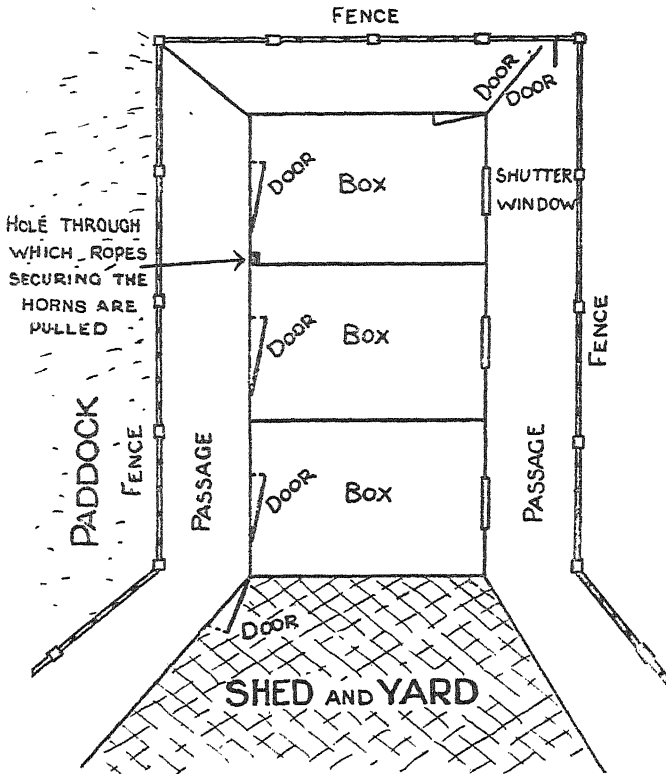
In the case of some of the wilder animals, such as the eland antelope, the securing and casting is the most difficult part, and,

owing to their great strength and activity, not altogether unattended with serious risk to the patient.

The method of procedure is as follows: The animals are first got into a yard with a shed. Leading from this is a narrow fenced passage leading along a row of boxes, each of which has a sliding door. The animals wanted are then driven along this passage and secured in different boxes. The first animal is then got into the farthest box and the door pulled sharply to. A shutter window in the opposite side is then opened—this also has a cord by means of which it can be sharply closed if necessary. The attendant or keeper, who keeps some distance from the window, then with a long wooden prop, on the end of which is adjusted the noose of a rope, endeavours to drop the latter over one of the horns. This is a matter of difficulty and requires a lot of dexterity and patience to accomplish, the animal being almost as quick with its head as with its hind legs, and that is saying a lot, and the attendant may get the prop sent flying out of his hands, getting a nasty jar in the bargain.

When one horn is noosed the animal's head is drawn up to the window by several men on the rope, and the other horn noosed with another rope. This latter is then thrown across the box to the door through which the animal entered, which is then opened and the rope taken and passed through a small opening in the boarded side of the right corner. By means of this the animal is then drawn over to the corner by men on the outside of the shed, the first rope of course being released. This is then thrown across and passed through with its fellow, and the animal is fixed. In the corner of the shed near to the shutter window is another door, which is opened, and several men carrying a shutter slightly larger than an ordinary door enter. The latter is then pushed lengthways up against the side of the animal, which is thus pinned up against the side of the box. A rope is then passed round the animal's neck and the ordinary figure of eight noose made. The knot rests on the withers and the two ends passed backwards over the hind part of the animal, and assistants holding the end of each rope. They are then dropped down on each side, and aided with a long iron rod with a hook at the end, and the kicking of the animal, are eventually got between the hind legs and drawn up to the thigh and kept tight by the assistants—who, needless to say, keep as far off the

animal's reach as possible. All this is not done without a lot of trouble, as the kick of these animals is like a flash of lightning, and delivered with immense force. When this is completed a noosed rope is got round each hind leg and drawn tight around the fetlock. The ends of these are then passed forward through the neck noose, pulling as much on the sternum as possible. The



legs are then drawn up to the noose, the animal let down, and fixed in the usual way—or as near it as it is possible to get.

This method of securing and fixing the hind legs with separate ropes was adopted because it was found that when the ends of the casting rope were brought back through the noose in the usual manner of side line casting there was, owing to the excessive struggling, great risk of strangulation occurring—these animals can almost tie themselves in a knot—and having a

separate pull on the withers from behind tended to equalize the pressure and keep the nooze well down on the lower portion of the neck.

The animal thus secured, castration is completed as follows: The testicle, which is small, somewhat rounded and very firm in consistence, is then grasped firmly between the finger and thumb of the left hand, and the scrotum, the skin of which is very thin and smooth, incised with a knife and the testicle exposed, enucleated from its tunics, which are severed at their attachments and stripped up the cord for a couple of inches or so. This is repeated with the other testicle, and both cords grasped with the clamps, severed with the actual cautery and seared, released, and scrotal wounds dressed, the whole procedure being carried out as rapidly as possible. The animal may be very stiff for a few days after this, owing to its excessive struggling. They are very bad for this, as they do not give over fighting until completely exhausted, and will renew their efforts as soon as ever they recover wind.

The dangers with these are the risk of broken limbs, strangulation and heart failure. The latter may arise from the excessive exertion, especially as I have noted on *post-mortem* examinations of these species an enormous deposition of adipose tissue around the pericardium, which, however, appears to be a normal condition, but which if met with in horses or cattle one would almost call a lipoma.

The operation completed, the ropes are taken off. The attendants leave the box and the ropes securing the horns are severed with a knife from the outside and the animal released.

A NEW (?) STRONGYLE CAUSING PARASITIC GASTRITIS IN A GOAT.

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Subject.—An aged female goat which had been acquired for experimental purposes but had not been used.

History.—The animal was gradually becoming more emaciated, although the appetite remained good. Temperature, respirations and pulse were normal, the conjunctival mucous membrane was pale, and the eyes appeared sunken. There was no diarrhoea,

but constant grinding of the teeth, with a "staring" coat, and a general "tucked-up" appearance.

Diagnosis.—The fæces were collected, mixed with distilled water, and carefully examined for traces of parasites. Numerous ovoid nematode ova were found, varying in size from 70 microns to 80 microns by 30 to 40 microns, and a few embryos varying in length from 300 to 400 microns, and resembling the embryos of *Strongylus rufescens*. No adult worms were present, however. Examination of the blood showed a fall in the number of red cells to about 5,000,000 per c.mm., and there was evidence of anisocytosis and poikilocytosis.

Treatment.—The animal was isolated and received daily 15 gr. of picrate of potash in meal. This treatment was continued for a week, but as there was no obvious improvement and the eggs

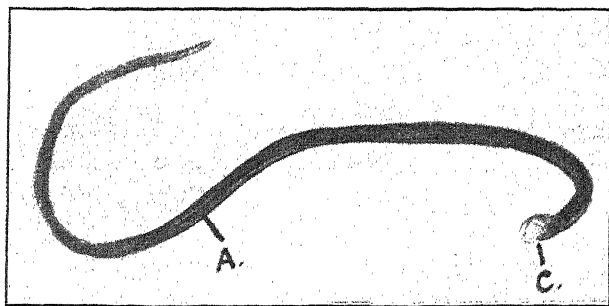


FIG. 1.—Male, showing straight alimentary canal (A) and lateral view of bursa (C). Magnified 45 diameters.

and embryos continued to be passed out in as large numbers as before, it was replaced by daily drenches of lysol $\frac{1}{4}$ in $\frac{3}{4}$ of water. Concurrently with this, powders were mixed with the food containing pulv. ferri sulph., cinchona, nucis vom., and anisi.

There was, however, no improvement, and the animal died fourteen days after treatment was commenced.

Post-mortem examination showed marked emaciation, and almost entire absence of fat. The thoracic organs appeared normal. The intestines showed no pathological alterations, and the contents were of the usual consistence, and contained only a few ova and embryos, no adult parasites. The first three stomachs appeared normal, and showed no traces of parasites.

The abomasum, however, contained a quantity of fluid material with an offensive odour, and the mucous membrane was of a dark purple colour, very much thickened and covered by a thick layer of mucus. The fluid contents contained only a few eggs and no adult worms. The surface of the mucous membrane was scraped,

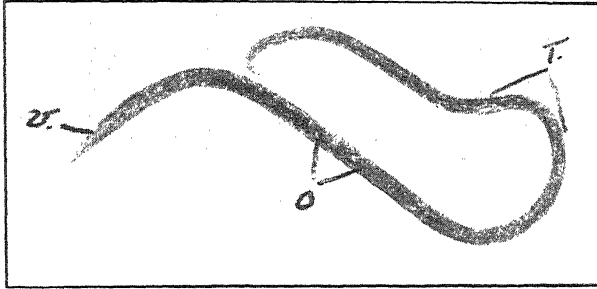


FIG. 2.—Female, showing (O), ova, (V) vulva ; (T) twist of uterus. Magnified 45 diameters.

the scrapings, mixed with distilled water, placed in a glass dish over a black surface, and search made for the usual goat nematode worms (*Strongylus flicollis*, *Æsophagostomum venulosum*,

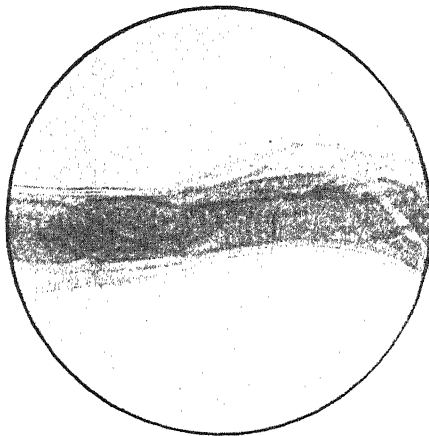


FIG. 3.—Twist of the uterus in female. Magnified 100 diameters.

Sclerostomum hypostomum, *Uncinaria cernua*, and *Trichocephalus affinis* (Neumann)). None were, however, visible.

The liquid was then poured off and carefully examined with a $2/3$ objective, and was found to contain two adult female nematode worms of a very small size, and numerous ova. It was

obvious now that the parasites were either buried in the masses of mucus, or in the membrane itself. The surface of the latter was carefully examined, but no trace of any nodules could be found. The mucus was, however, mixed with a few cubic centimetres of water and violently shaken in order to break up the masses, and 2 per cent. formaldehyde added to render the worms sufficiently opaque to be visible to the naked eye. The material was again poured into a glass dish, placed over a black cloth and examined. The fluid was now seen to contain a huge number of extremely small round worms, varying in length from 3 mm. to 5 mm., and still scarcely visible to the naked eye. Under the microscope they were found to be too opaque, as a result of the formalin, to

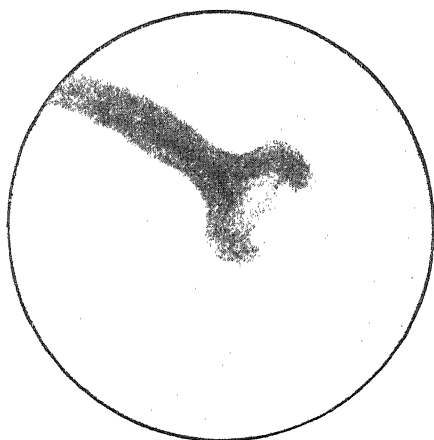


FIG. 4.—Caudal bursa of male. Magnified 100 diameters.

ascertain their anatomy properly, and were therefore treated as follows:—

Several of the worms were placed for five minutes in boiling 80 per cent. alcohol, transferred to a solution of one part of glycerine in 90 parts of absolute alcohol in a watch-glass, and placed in the incubator until all the alcohol had evaporated. They were now almost transparent, and scarcely visible with the naked eye. The parasites were now placed in a solution of glycerine and fuchsin, in which they were allowed to remain for one minute, were washed in glycerine, and mounted in glycerine jelly. On examination with a $\frac{2}{3}$ objective they were found to be stained a bright pink colour, and the structure could be made out quite easily.

Anatomy.—A small filiform worm gradually enlarging in a posterior direction. The mouth is nude and represented by a slight depression from the base of which the alimentary canal begins. There is no differentiation into cesophagus and intestine, the whole being in the form of a narrow straight tube which widens out at the junction of the anterior and second fourths of the worm.

The male is from 3 mm. to 4 mm. in length, and possesses a trilobate caudal bursa, the central lobe being ill defined; each lateral lobe is supported by five rays, of which the middle three arise from a common stalk, but are separate for almost their

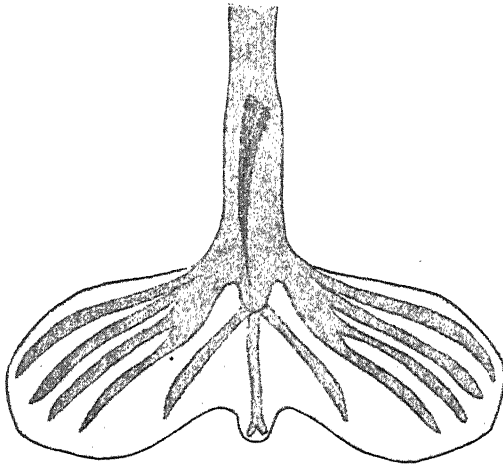


FIG. 5.—Diagrammatic representation of caudal bursa of male. Magnified about 150 diameters.

entire length. The spicules are two in number and of equal length.

The female is from 4 mm. to 5 mm. in length. The tail is abruptly contracted to a narrow point, is conical, and has no well marked constrictions.

The uterus is a long straight tube which occupies the posterior three-fourths of the worm, and is doubled on itself at its anterior extremity, and shows well marked transverse ridges. The vulva is situated in the posterior fourth, towards the extremity. Many of these worms show a double twist at about their centre, but whether it is uterus twisted on itself, or intestine round uterus,

it is difficult to ascertain; probably it is simply a double twist of the uterus.

The ova are not hatched in the body of the female. The worms closely resemble the strongyle of Axe, which is found in the stomach of the horse but apparently causes no ill effects, and the *Strongylus gracilis* of cattle and sheep, from which, however, they differ in several respects.

THE VACCINE TREATMENT OF MAMMITIS IN CATTLE.

By ARTHUR PAYNE, F.R.C.V.S.

Weybridge.

In my hands the ordinary methods of treatment for mastitis, or mammitis, in dairy cattle have been very unsatisfactory. By the ordinary methods I mean external applications, internal administrations of drugs and injections of medicated fluids into the glands.

The application of vaccine therapeutics is at a more or less experimental stage, and it occurred to me that here was an opportunity for the vaccine therapist.

Not having an extensive cattle practice, I cannot obtain the necessary number of cases to give the treatment a fair trial, and so am just giving a few cases in the hope that a practitioner with more opportunities will follow it up, as I consider the diseases affecting the mammary glands to present an ideal field for the application of vaccine therapy.

The three cases which I here place on record presented features which indicated a streptococcic origin, in that form of mastitis which is commonly attributed to the streptococci and known as sub-acute mastitis (Leblanc-Nunn).

Of course, I am quite aware that the classical treatment should consist of the formation of an autogenous vaccine, but this in an ordinary cattle practice would not be practicable on account of expense entailed in the process.

I will just give a rough outline of the symptoms presented in each case, and then the combined treatment.

(1) Shorthorn cow, in good condition (third calf), calved three months. The left hind-quarter was enlarged and indurated at the lower two-thirds, and there was a nodule at the base of the teat about the size of a horse bean. The mammary secretion was thin

watery, and flocculent. This condition had been present about three weeks.

(2) Dutch heifer (at same farm), calved three days when I was asked to see her. The right hind-quarter was inflamed, enlarged and indurated, and there was a pea-like nodule about mid-way up the true canal. It was an impossibility to draw any milk from this quarter, which was not materially changed in its physical characters.

(3) Dutch cow (third calf), calved five months. Right hind-quarter enlarged at the lower two-thirds and indurated; milk thin and watery, and flocculent. The cowman stated that the cow's udder was normal a few days before, but this statement I very much doubt, and should consider that the condition had been present some weeks.

The vaccine consisted of killed streptococci and staphylococci (P., D. and Co. combined) subcutaneously injected into the fold of skin above the udder and anterior to the patella.

Each cow received altogether four injections, commencing with 250,000,000, and ending with 750,000,000, with three days' interval between each dose.

In each case after the second dose there was a slight improvement, the mammary secretions were more abundant, and the glandular substance was not so resistant.

A week after the last dose the heifer's quarter was practically normal in every respect. The shorthorn's was notably smaller, and the nodule decreased to half its original size.

The Dutch cow's quarter was enlarged when treatment was commenced, till the skin appeared to just accommodate the gland, but a month after treatment the swelling was so much less that the skin was wrinkled.

I am quite aware that my method of applying the treatment was crude in the extreme. I ought to have noted the thermal reaction, the various phases, changes in the secretions, systemic disturbances, &c., but both farms were some distance from my surgery, and I could not spare the time to make the necessary visits.

The cowman informed me that the day after each injection the cows "seemed a bit queer" and "tucked" (*i.e.*, increased respiration).

If other surgeons have used vaccines for mammary disease, it

would be interesting to hear the result, as I think that this treatment is clearly indicated here.

"Clinical Bacteriology and Vaccine Therapy" (W. M. Scott) is presented to the veterinary profession at a very opportune moment. I have read it with great pleasure and appreciation, and with great advantage to myself. It is a work which must appeal to every veterinary surgeon. It is written for them, and by a member of their profession, which in my opinion is a great recommendation, and every veterinary surgeon, in my opinion, should own a copy.

CONGENITAL OPACITY OF THE CORNEA.

By J. B. HARE, M.R.C.V.S.

IN October last I was sent for by a wealthy client to advise as to the treatment of some cocker puppies. I found a litter of four cocker spaniels of valuable strain 6 weeks old. From my client's letter alluding to their eyes being affected, I concluded I had distemper to deal with, but this was not the case. On examination I found all four pups very lively, well nourished, and perfectly healthy, also the bitch. There were two blacks and two browns. One black pup had complete opacity of the cornea in each eye, the other black had partial opacity affecting both eyes; and of the brown pups, one showed very slight marginal opacity of both eyes, the remaining one was quite free from disease. Inquiry elicited the fact that they had never ailed anything, father and mother were free from any eye affection, and a previous litter by the same parents had normal vision. I felt certain that little could be done, and told my client so, but by way of treatment, I ordered *lotio. argent. nit. gr. iii, aq. destil. ʒi*, a few drops to be placed in each eye twice daily. I also ordered extra nourishment in the form of *Virol* to be given.

I wrote an account of the cases to Professor Hobday, and he very kindly replied, practically agreeing with my views, and advising as a trial *eserin sulph. gr. i to ʒi*, to be applied daily with camel hair brush. This was done, and treatment continued, alternating with previous lotion for a month. At the end of that time no improvement had taken place, and the black pup with complete opacity was destroyed. The others are being kept in the hope that they may improve. Never having met with a similar case, I record it in the hope that other practitioners may have done so and will give their views.

TRANSMISSION OF SARCOPTIC MANGE FROM DOG
TO MAN.

BY JOHN BUSCOMB, M.R.C.V.S.

Stroud.

IN THE VETERINARY JOURNAL for November, 1912, there was published an interesting summary of a number of cases in which it was clearly shown that sarcoptic mange had been transmitted from infected dogs to their human attendants.

The undermentioned brief note is penned in further corroboration of this fact, which is not, I think, sufficiently well known amongst the members of either the medical or our own profession.

Last month I was called in to treat some toy Pomeranian puppies, the subject of distemper, and my attention was also drawn to the fact that they were scratching themselves very much. Owing to their distemper illness I did not dress the skins at all, but endeavoured to nurse them through the more serious malady first.

As they did not make good progress and were of considerable value, besides being very much thought of by the owner, I consulted with Professor Hobday and sent them to his infirmary in London, where he confirmed my diagnosis of sarcoptic mange.

The particular point of interest for this article, however, is that the maid who first looked after them and nursed them very devotedly complained of a skin irritation of the arms and hands, and at Christmas time, as the owner and his household went away, the puppies were given into the charge of two neighbours, each of whom took a puppy. On my visit after the Christmas holidays each of these neighbours had caught the disease and complained of severe skin irritation, which took the form of tiny isolated (and very itchy) spots on the arms. The irritation was so troublesome that a medical man was called in to treat them, and although at first he did not recognize the source of the infection he has since done so, and has confirmed my diagnosis.

I place this on record, as I think that the fact of the very contagious nature of sarcoptic mange from dog to man should be more universally recognized.

A CASE OF TRUE HERMAPHRODITISM.

BY FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.

Kensington, W.

THE subject, a fox-terrier, was 9 years old and had been in the possession of the owner since 12 months old, having been purchased at the Battersea Dogs' Home. The animal was admitted to hospital with acute cystitis. All attempts to pass a catheter failed absolutely, and the urine was withdrawn through the abdominal wall by a trocar and cannula. Owing to the collapsed condition of the patient an unfavourable prognosis was given, and death occurred about twelve hours later.

Externally the under surface of the body had the well-developed penis of the male, but no testicles were visible. There were twelve symmetrically and regularly arranged teats of quite as large a size and quite as well developed as in a female of that age.

The owner stated that when passing urine the animal generally raised its leg like a dog, but sometimes squatted like a bitch; it had never been observed to try to mate either with male or female, but would sometimes follow a bitch for a short distance and then leave her.

The body was sent to the Royal College of Surgeons' Museum, and the Curator (Dr. Shattock) reported as follows: "It will make an excellent specimen, as it is essentially female within with external male characters, a very rare thing as contrasted with the contrary—at least, so far as man is concerned."

Reviews.

Horse-shoeing. By Lungwitz and Adams. London: Lippincott Co. 8vo. Price 7s. 6d. net.

Notwithstanding the coming of motor haulage, horse-shoeing still continues both a necessity and a lucrative employment for the skilled artisan. The trade has an intimate connection with the veterinary profession, in cities most veterinary surgeons being master horse-shoers, and in rural practice the smith plays no unimportant part in assisting to relieve lameness in the hoof and in adapting modes of shoeing to relieve defects in the limb. In this country horse-shoeing has remained more an art than a science; for some time an effort has been made to improve the

art with satisfactory success, but even with such an effort much still remains to be done before we can consider our registered shoeing smiths entitled to be considered scientific.

The book under review at once arrests attention and admiration from the apparent scientific treatment of the subject in all its varied aspects, and if horse-shoeing is practised by men who are conversant with such training the boon to both horses and owners will be incalculable. Part I is devoted to a consideration of the gross anatomy of the horse, and as such contains much that is not relevant to the shoeing of the hoof. More might have been added to explain the beauty of muscular action in the true movement of the limb, and also some of the congenital and acquired conditions in which that harmony is disturbed, and how by shoeing it is possible to relieve or overcome such defects. The description of the bones, tendons, and ligaments enclosed in the horny box and the joints immediately above it is good, so also is that of the blood-vessels and nerves. Much more appropriate and valuable is an excellent description of the anatomy, physiology, and histology of the horn and its secreting membranes. Space does not permit lengthened criticism; to the shoeing smith it is immaterial whether the horny laminae are secreted from the sensitive laminae or whether they are, as described by Chauveau (p. 810), secreted at the inferior border of the coronary cushion; the scientific man will satisfy himself upon the point.

The whole of Chapter II upon the foot in relation to the entire limb is very good, and makes up in some measure for the omission we noted *re* muscles. The diagrams illustrate abnormalities in the shape and disposition of the bones of the limbs. A horse may have a perfectly shaped limb in repose which in action, owing to disturbed harmony of muscular contraction, will give rise to that which is aptly termed in this book defective "flight of hoof in motion." The illustration upon the floor surface is good, but the cycle of movement is not upon the floor, and the defects might be illustrated by deviations of a circle or ring, which have proved in teaching to be easily capable of apprehension. The section upon influence of weights upon hoof in adjusting irregular action is good, so also is that upon various forms of hoofs. These are followed by a very entertaining description of the "physiological movements of the hoof."

Here follows the section of the actual art of horse-shoeing with ample details. The preparation of the hoof to receive the shoe might have included a list of the frequent fashionable mutilations of the hoof so much seen in city forges. The chapter on forging interfering and speedy cutting contains useful information, and that on prevention of slipping is good. Hoof nurture might have been extended. It is most important that every effort should be made to increase both the quantity and quality of defective horn.

Shoeing defective hoofs and lame horses is distinctly a surgical subject, but it is one with which a shoeing smith is of necessity conversant. It is interesting to note that in the treatment of sand

cracks and other longitudinal fissures, the use of the plate and the "vaulting" of the sole immediately under the fissure has long been practised in Liverpool with happy results. The book is well illustrated, many of the diagrams are old friends, it is well printed and agreeably written; it is a most welcome addition to a subject of increasing importance, as by careful, well-considered shoeing it is possible to extend the working days of defective horses, and so help to offer a continued commercial resistance to motor haulage for heavy weights over reasonable distances. Owners of shoeing forges and veterinary students, ante- or post-graduate, will appreciate an attractive educative volume at a most reasonable price.

H. S.

Statistical and General Report of the Army Veterinary Service for 1912. Printed by Harrison and Sons, St. Martin's Lane, London. Pp. 100.

This report, issued by Major-General R. Pringle, Director-General A.V.S., is as interesting as ever to peruse. The man who dabbles in statistics will find food for reflection therein for many days. He will learn that the most useful period of the horse's life in the Army is from 5 to 12 years of age, and that the average service of horses is about five years. There were four cases of anthrax and five of glanders during the year. Anti-strangles serum has been largely used, but the results obtained do not seem to compare favourably with the great amount of labour and expenditure this serum treatment entails. The admissions for catarrh in 1910, 1911, and 1912 were 1,046, 1,162, and 1,140 respectively, so that the use of the serum as a prophylactic does not appear to have reduced the number of cases appreciably. As regards strangles, in 1910 there were 613 cases; in 1911, 470; and in 1912, 554; the admissions per 100 this year were 2'438, whilst in 1911 they were 2'065. The average number of days the horses were under treatment in 1912 was 32'82, whilst in 1911 it was 33'26. In 1910, 3,931 doses of anti-strangles serum were issued, whilst in 1912, 13,050 doses were given out. The above-mentioned results and comparisons do not seem to prove that the use of the serum has been of much benefit, and yet the number of experiments appear to have been sufficient to form a judgment. Ninety-four horses became "affected in the wind after inoculation." Ringworm shows an increase. In 1911 there were 1,068 cases, and in 1912, 1,130. In 1910 there were 50 cases of otitis; in 1911, 74; and in 1912, 126. The numbers show a considerable increase, which may be explainable. 121 horses were cast as roarers, and 62 were operated on, of which "31 improved, 22 did not improve, 8 were not tested, and 1 died." The report does not say whether any cures resulted, and is not so gratifying as those obtained from other quarters (British, American, German, and Italian).

Sprains of tendons and ligaments seem to incapacitate the greatest number of Army horses, and diseases of the digestive

and respiratory systems come a good second and third place respectively.

The Reports of the Army Veterinary Service in South Africa and a Report on the horses, mules, and camels in Egypt for the year ending March 31, 1913, are included in the present publication. In Egypt sand colic appears to have almost become extinct, and this has been brought about by an altered system of feeding and the use of muzzles whilst the horses have been standing in camp and open lines. The Annual ends with a short report on the Army Veterinary School, Aldershot. From it we learn that two classes in animal management, three farriers' classes, and eight classes for officers of the Army Veterinary Corps have been held during the year, a very useful record of work done in this school.

P.S.—We notice that all the cases of pneumonia appear to be *sporadic*. There is no record of any influenza cases, which is rather remarkable, and thirteen cases of syncope with death would hardly seem to be rightly classified under "Circulatory Diseases."

G. M.

Tropical Veterinary Bulletin. Issued under the direction of the Honorary Managing Committee of the Tropical Diseases Bureau, Imperial Institute, S.W. Sold by Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, W.C. Editor: A. L. Sheather, B.Sc., M.R.C.V.S. Price 3s. net.

The fifth number of vol i of this *Bulletin* contains references to a wide range of subjects, and will be quite as useful as its predecessors to those concerned with tropical diseases and medicine. Babesiasis and anaplasmosis, trypanosomiasis, and the part played by intermediate hosts as regards the human trypanosome, spirochaetosis, leishmaniasis, toxoplasmosis, &c., are all referred to, and the literature overhauled seems to be well up to date. To bacteriologists and protozoologists the periodical must be very valuable, and the wide range of animal and human diseases which are peculiar to the Tropics indicates the necessity of reliable literature on the subject. Unless one is acquainted with the importance and proportion in the land of origin of many of the tropical diseases referred to, one can hardly review this quarterly publication adequately. Glancing through it we notice the first unfavourable review (if it may be called a review, for it only consists of a few lines) we have yet read of Mr. Scott's work on "Clinical Bacteriology and Vaccine Therapy." We think that a well-written review of a book ought to do more than call attention to a few errors in spelling. On p. 259 of the *Bulletin* we notice "Beobachtungen über, &c.," translated as "the occurrence of"; "über die Kultur" on p. 261 translated as "the cultivation of"; and on p. 293 "Ueber die Morphologie und das Verhalten" translated as "the Morphology of, &c." The authors of these articles are entitled to a little more care in the translating of the titles of their works.

G. M.

Annual Report of the Muktesar Laboratories. By the Imperial Bacteriologist (J. D. E. Holmes).

A report of the work and products of this Laboratory has recently been published and is full of interest. Some idea of the enormous amount of useful work done by this institution may be gathered from the fact that in 1910 over a million doses of anti-rinderpest serum were manufactured. Added to the many difficulties which attend the use of sera in the ordinary way veterinarians in India have to contend with native prejudices, and in vaccinating it is most important to ensure that working oxen are not incapacitated even for a day.

Reports of research work conducted at the Imperial Laboratory have frequently appeared in the Indian medical journals, in the *Centralblatt für Bakteriologie*, and in English veterinary periodicals. The first of these were the work of Dr. Lingard, who in 1890 was appointed Imperial Bacteriologist, though the work was then conducted at Poona. In 1893 the Muktesar Laboratory was built and Lingard was at its head until 1908, when he was succeeded by Captain (now Major) J. D. E. Holmes, the present Imperial Bacteriologist. The publications cover a wide range of subjects, including dourine, epizootic lymphangitis, anthrax, hæmorrhagic septicæmia, bursitis, black quarter, and piroplasmosis. Finally, there is a report by Major Holmes on the cure of thirty-two cases of surra by the administration of atoxyl, followed by a course of arsenious acid in increasing doses, according to the tolerance of the animal. If the success of these cases is followed by others, and the method proves of practical value in even the greater proportion of animals treated, horse owners and the Government of India will be deeply indebted to the investigator.

Mallein, blacklegoids, hæmorrhagic septicæmia vaccine, anthrax serum, and the rinderpest serum are all made at the Laboratory, but tuberculin, for which the demand is small, is purchased.

The report gives a clear idea of the arrangement of the institution, and it is surprising to workers in England to read that the Laboratory estate covers 7,000 acres, and has an elevation of over 7,000 ft. With such an area available the buildings are well isolated and sheds are provided for dealing with each of the more deadly diseases, as well as separate "out-kraals" for experimental cattle. About forty clear photographs show that the laboratories are well equipped and good provision seems to be made for the native office itself. For officers of the Army Veterinary Department who attend for two months courses of post-graduate instruction, a bungalow is provided, and a club has been established with tennis and Badminton courts, &c.

Could such publications as this under consideration be in some way brought to the notice of the general public, it would do much to increase the value of the estimate at which the services of the veterinary profession are generally esteemed.

Annual Administrative Report of the Bombay Veterinary College and Civil Veterinary Department in the Bombay Presidency, including Sind, for the Official Year 1912-1913.

The Report of the Bombay Veterinary College as submitted by Mr. K. Hewlett, M.R.C.V.S., the Principal, shows that veterinary matters are advancing in the Presidency. The number of students in the College has slightly increased, the majority coming from the Bombay Presidency. The number of cases of glanders and surra has decreased. There are twenty-seven scholarships awarded by Government for students of the College. Tennis courts and a cricket ground have been provided for the students; 3,450 in-patients and 3,006 out-patients have been treated at the College. The average daily attendance of patients was 263. All the students who passed out of the College in 1910 are employed, and 21 out of 25 qualifying in 1911 are working. The Examination Committee report that the students have been well taught and that the results are satisfactory.

Lieutenant-Colonel H. M. Maxwell reports on the Civil Veterinary Department. He inspected many veterinary dispensaries and the stallion stations, whilst Mr. J. D. Buxy, recently appointed Deputy Superintendent, ably assisted his chief, especially with such work as preventive measures against anthrax, rinderpest, and glanders.

Twenty-five more cases of rabies were reported than in the previous year. The total was 75 as against 50.

There are forty-two stud bulls belonging to local bodies operating in the Presidency, and thirty-five stallions are on the register.

The whole report is gratifying, and shows how much has been done, and suggests how much there is to do. The field is wide and the work plentiful.

The Agricultural Journal of British East Africa, March, 1913.

Edited by the Staff of the Agricultural Department. Printed at the Standard P. and P. Works, Nairobi.

This quarterly publication gives evidence of doing very useful work. In the editorial at the commencement of the journal attention is called to the fact that the Council of the British Dairy Farmers' Association is creating a special class at next year's dairy show for bacon cured anywhere throughout the British Empire. The artificial drying of coffee (usually sun-dried) is described as conducted by Mr. Cooper and Mr. Monson at Kabete Farm. The plant for drying tobacco was used by these gentlemen, and apparently some very good results were produced, showing that in future coffee and tobacco may be dealt with on the same farm, more land put under cultivation, and more profit obtained. The article on "Ostrich Farming," by Professor Duerden, is well illustrated, and gives an interesting account of the industry. Captain C. A. Neave, in a paper on "Pack Animals v. Porters in B. E. A.," calculates that a saving of £5,100 would be made in wages if pack animals (mules and donkeys) were substituted for porters by travelling officers. The risks of dealing with large bodies of indifferent attendants would

also be obviated. "Linseed and its Culture" is discussed by James Johnston, and "Citrus Culture" by W. T. Barlow, whilst H. W. Buckland, in a short article on "Apple Growing in British Columbia," calls attention to the fact that the usual area for an apple orchard is from ten to twelve acres, and that ordinary fruit land costs from £40 to £50 per acre. The periodical concludes with "Notes from Exchanges" and "Government Notices." In the former we notice the following for destroying ants in the house: Make a syrup of sugar and water, to which add some powdered borax, and evaporate to a honey-like consistency. Place this about the nests and on the shelves of the house. To protect stock from flies, apply this mixture to the skin with a brush: 1½ lb. resin, 16 oz. soft soap, 10 oz. of fish oil, and two to three gallons of water. G. M.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard, Telegrams, "Baillière, London."

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MR. D. S. PRENTICE, M.R.C.V.S.,
Chief Veterinary Inspector for the Department of Agriculture and Technical
Instruction for Ireland.

THE VETERINARY JOURNAL

MARCH, 1914.

MR. D. S. PRENTICE, M.R.C.V.S.

THE national importance of a well organized Veterinary Department has been fully demonstrated recently by the prompt measures taken to deal with the recent outbreaks of foot-and-mouth disease in Great Britain and Ireland, and the value of such a department to stock-owners cannot be overestimated. That a keen and capable man should be appointed as head of the department is an essential factor, for a wrong order issued from headquarters might mean a blunder which would cost the country many thousands of pounds.

That Mr. Prentice possesses these qualifications to a marked degree is shown by the fact that upon the death of the late Mr. Hedley, he was immediately selected to succeed him, and his exceptionally friendly yet firm relations with the veterinary inspectors of Ireland prove that he is the right man in the right place.

Graduating from the Irish Veterinary College in 1882 he was appointed in the same year as a veterinary inspector to the Veterinary Department of Agriculture and Technical Instruction for Ireland; in 1888 he was promoted to be Travelling Inspector, and afterwards Superintendent Transit Inspector, from which position he became Chief of the Staff. His duties are onerous and his responsibilities great, but he has proved that he does not shirk them, and although the breeders and owners of Ireland hope that he may never have abnormal chances of exercising his powers they feel that in his hands the welfare and health of their cattle are as safe as is humanly possible.

Editorial.

THE LEGAL LIABILITY IN CASES OF HONEST OPINION.

TWICE recently have veterinary practitioners been summoned as defendants, in conjunction with horse-owners or horse-keepers, when their opinion has been given that the animal is fit for work, and as the annoyance is serious it behoves us well to consider our position. In one case in particular the animal had had chronic lymphangitis for more than two years, and, although unsightly from the enlarged appearance of the thick leg, was much better at work than standing in the stable. Apparently all right one day, and ordered to work by the practitioner, this animal was stopped by the police two days later, with no lameness but quite justifiably, on account of a palpably fresh sore on the leg (the result of an abscess), but the veterinary surgeon who had examined it two days before and had detected no sore or swelling to be present then, was also included in the charge. Needless to say, that after his evidence, and that of several of his veterinary confrères, the charge against him was dismissed, but the result by no means compensated for the anxiety, annoyance and loss of time which he had been caused. As bearing on the point the opinion of Mr. Justice Channell, as reported in the Law Reports, 2 Queen's Bench Division, 1898, page 641, the case of Benford and Sims is worth quoting as it gives a certain amount of consolation to those who may become unfortunate victims. In the concluding sentence of his judgment he says:—

“I must point out that our decision on . . . affords no ground whatever for supposing that a veterinary surgeon who gives a wrong opinion and commits an error of judgment is liable to be convicted of cruelty if the effect of his opinion being followed is that the act of cruelty itself in fact results.”

Let the practitioner recollect this and refer it to the notice of his solicitor if ever misfortune of this nature overtakes him, and the fact that such is likely any day to occur is a strong argument for the membership without delay of the National Veterinary Defence Society, the advice of whose committee is always willingly given when asked for.

General Articles.

A REPORT ON FOOT-AND-MOUTH DISEASE IN IRELAND IN 1912 TO THE DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

(Abstracted.)

(Continued from p. 73.)

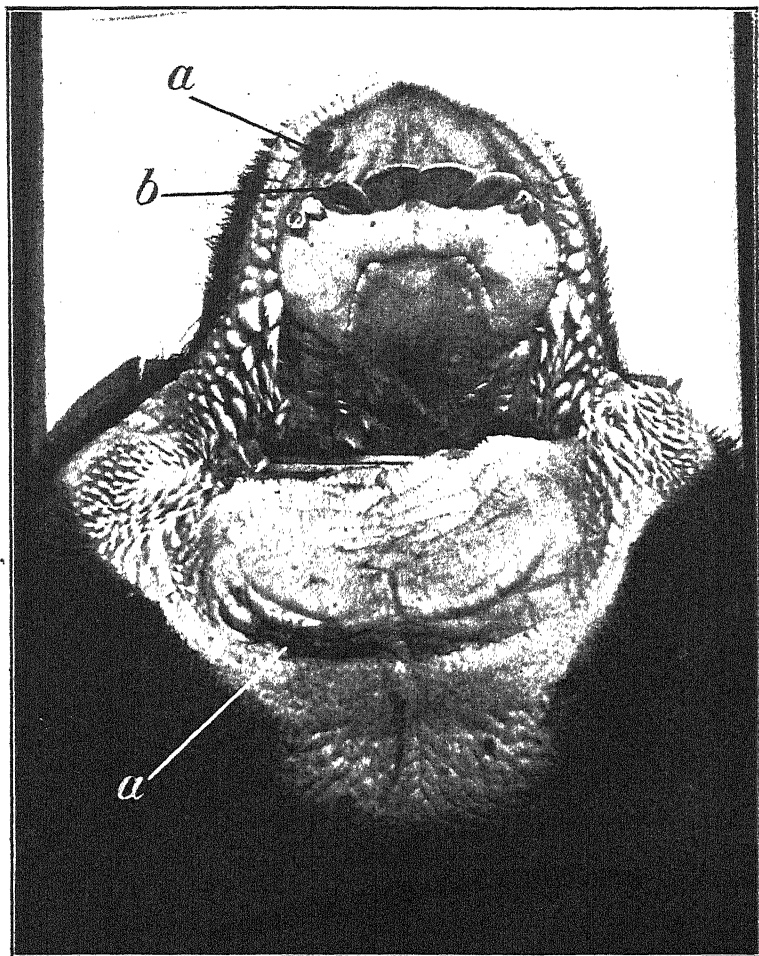
HAVING regard to the fact that the in-contact animals were being shipped to Great Britain, it was considered proper to at once apprise the Board of Agriculture and Fisheries of the details of the case, and, if desired by the Board, to forward the tongue of the bullock for examination by their veterinary officers. On this being done the Board requested the tongue to be sent to them, and on its receipt they telegraphed to the Department to the effect that the Chief Veterinary Officer was of opinion that the animal to which the tongue belonged suffered from foot-and-mouth disease a month or two previously, that the lesion could have arisen from no other disease, and that acute lesions of the disease might occur in cattle in contact with the bullock in question. The cattle on arrival at Dundee were consequently detained for a prolonged period in quarantine, in anticipation of disease appearing among them. The animals, however, remained healthy, being subsequently distributed to farms in Scotland, and no case of foot-and-mouth disease occurred in that part of Meath from which the eighty bullocks had come.

A case somewhat identical in character to the above occurred on November 30, also at the port of Dublin. During the examination of animals prior to their shipment to Manchester, a heifer belonging to a lot of forty-six cattle was found to exhibit a healing abrasion on the upper surface of her tongue, near its tip. The lesion was almost similar in appearance and in age to that found in the case of the bullock already referred to. The mucous membrane had been removed, and the lesion was in a semi-healed state and not unlike that which might arise from foot-and-mouth disease. The heifer was otherwise in normal health. All the animals comprising the lot about to be shipped were critically examined and found perfectly healthy. The heifer, with others brought forward for shipment on the occasion,

had been purchased a couple of days previously from a cattle salesmaster, and had grazed for several months on his farm in the County of Meath, at a place distant many miles from the lands from which the bullock referred to in the preceding case came. It was not considered that the case was one of foot-and-mouth disease, but having regard to the fact that the Department were in correspondence with the Board of Agriculture and Fisheries respecting the somewhat similar case discovered at the port two days previously, it was determined to slaughter the heifer and to prohibit the shipment of the in-contact animals. These animals were accordingly detained and isolated. The heifer was slaughtered and her tongue kept available for examination by the Board's veterinary officers, if they so desired. The facts of this case were communicated to the Board, who sent one of their veterinary inspectors to Dublin. He examined the isolated animals and the tongue of the slaughtered heifer on December 2. He found no disease among the cattle, but expressed the opinion that the heifer to which the tongue had belonged suffered from foot-and-mouth disease, and at his request the tongue was despatched to the Chief Veterinary Officer of the Board for his examination. Meanwhile, immediate and exhaustive inquiries had been made at and about the farm in the County of Meath from which the heifer and other animals had been moved, first to the Dublin market, and then to the port for shipment. A large number of cattle with which the heifer and her companions could have come in contact were critically examined, and full inquiries instituted, but nothing whatever was ascertained which would at all support the conclusion arrived at by the officials of the Board of Agriculture as to the existence of foot-and-mouth disease.

In order to support the view taken by the Department's officers in connection with this case, the tongue of the heifer was shown to Professor Mettam, M.R.C.V.S., who, whilst unable to say that the condition exhibited did not arise from contagious foot-and-mouth disease, considered it might be due to pseudo-foot-and-mouth disease, having regard to the history of the case, of which he was informed.

No appearance of the disease occurred among the isolated in-contact animals. They were kept under daily observation until December 19, when the Board of Agriculture and Fisheries



(NEWRY-BIRKENHEAD CASE.)

Portion of the mouth of a bullock shipped from Newry to Birkenhead on December 3, 1912.

a, a, injuries to lips caused by broken tooth. *b*, broken tooth opposite injury to lip.

intimated that they no longer objected to their shipment to Great Britain. The cattle on the farm in Meath, where this heifer came from, were placed under restrictions, and inspections of them were subsequently made, but no disease occurred among them.

The lesions as observed in the two foregoing cases were not in an early or acute stage. As already mentioned, they were semi-healed, and consequently the diagnosis was much more difficult than if they were seen in their early development. They might readily be mistaken for lesions of foot-and-mouth disease, especially in the absence of the histories of the cases—but the circumstances strongly indicated that they resulted from a form of stomatitis distinct in character from foot-and-mouth disease. Other cases of the kind were on a later date discovered at Belfast port, when an opportunity was afforded of observing the development of the lesions, with the result that no doubt remained as to the malady being entirely different from foot-and-mouth disease. The circumstances are as follows:—

On February 14 a lot of eighty-seven cattle arrived at the port of Belfast from the County of Tyrone. They were intended for shipment to Ayr. On veterinary examination being made, however, seven of these animals were found to suffer from stomatitis, the lesions of which were abundant on the muzzles, outer and inner parts of the lips, and on the tongues of the cattle. On the upper surface of the tongues of three of these cattle, near the tips, large patches were observable. These were covered with necrosed tissue (entirely different from vesicles). The necrosed tissue was easily removed, and where this was done a reddish coloured surface was exposed. There were no feet lesions, and the animals exhibited no constitutional symptoms of illness. The Department's Portal Supervisor at Belfast, who considered the animals were not affected with foot-and-mouth disease, detained the entire lot of eighty-seven cattle and asked for instructions. One of the Department's senior veterinary inspectors, who was specially familiar with foot-and-mouth disease during the recent outbreaks, was at once despatched to Belfast, and he corroborated the opinion of the Portal Supervisor as to the absence of foot-and-mouth disease.

As the animals were intended for shipment to Scotland, the Board of Agriculture and Fisheries were communicated with, and their superintending veterinary inspector examined the

cattle two days subsequently. I was present during this examination. The muzzles, lips, and tongues of the animals still exhibited distinct lesions of stomatitis. The necrotic tissue which covered the larger patches on the tongues of the three cattle had been removed, and the abrasions produced were fast healing, showing lesions practically similar to those observed on the tongues of the County Meath cattle referred to in the two preceding cases, although the healing process had not at that time advanced quite so far as was observed in the Meath cases. The remaining eighty cattle forming the lot were examined, with negative results. The eighty-seven cattle had been kept for weeks on farms in the County of Tyrone, immediately before being moved to Belfast. All animals remaining on these farms, or which could have come in contact with animals thereon, were without delay critically examined and found to be healthy.

After being communicated with by their superintending veterinary inspector, consequent on his examination of the cattle in Belfast, the Board of Agriculture and Fisheries informed the Department to the effect that they had no objection to the exportation of the animals. The Department, however, decided to defer shipment, and kept the cattle under observation. The lesions healed in a comparatively short time and more rapidly than is usual in foot-and-mouth disease. The malady did not extend to any of the other cattle in the lot.

Measures were taken by the Department, under strict conditions of isolation, with a view to inoculate other cattle with material taken direct from the affected animals, but with negative results. This disease is possibly of a fungoid origin.

On December 3 the s.s. *Ivcagh* sailed from Newry for Birkenhead, having on board 73 cattle, 143 sheep, and 525 swine. All of these animals prior to shipment had been under the observation of the veterinary inspector at Newry for a considerable time. Nothing was noticed amiss with any of them, and accordingly the veterinary inspector issued the requisite certificate for the shipment of the live stock to Birkenhead. These animals were all intended for immediate slaughter and in accordance with the then existing arrangement none of them were "mouthed" when being inspected. On December 4 the Board of Agriculture and Fisheries informed the Department by telegram that their veterinary inspector at Birkenhead had found

one of the cattle belonging to this cargo to be affected with foot-and-mouth disease, and in a further communication on the following day the Board stated that their veterinary inspector reported the discovery of four more cattle affected with the disease among the cargo, but that the sheep and swine were all healthy.

On receipt of the first intimation from the Board, immediate steps were taken to locate the places where each of the seventy-three cattle came from before being shipped from Newry. These places, which are situated in the Counties of Armagh, Monaghan, and Tyrone, were quickly located. All animals remaining on them were found free from disease, but, as a matter of precaution, their movements were restricted by service of special notices. In the communications from the Board some misapprehension appears to have at first existed as to the ownership of the five cattle reported to be affected with the disease, but subsequently it was learned that all of these animals belonged to one dealer, who shipped a total number of twenty-seven cattle to Birkenhead on the occasion, and it was then ascertained that four of the affected cattle, including the animal first detected, were obtained from two farms in the County of Armagh, and the remaining animal from a farm in the County of Tyrone.

Immediately after information was received from the Board of Agriculture and Fisheries as to detection of the disease at Birkenhead, one of the Department's senior veterinary inspectors was instructed to proceed at once to London and examine the lesions of disease found to exist in the case of the animal which was first detected at Birkenhead, it having been learned that the parts of the animal on which these lesions were situated had been forwarded to the Board's offices at London, and, on reaching the Board's offices, the inspector was shown certain conditions on the tongue (which had arrived from Birkenhead) said to be lesions of foot-and-mouth disease. The portions of the remaining four cattle regarded as exhibiting appearances of the disease had not at the time reached London, but, at the request of the Department, the parts showing the lesions of the first case discovered, and subsequently of the remaining four cases, were forwarded by the Board of Agriculture and Fisheries to the Department for examination. These consisted of the tongue and upper lip (with gum attached) of the first animal detected at Birkenhead, and the upper and lower lips (with gums attached) of the other four

cattle. On examination at the Department it was found that the lesions exhibited in each case were not those of foot-and-mouth disease. The tongue (of the first animal detected at Birkenhead) showed elevations and peeling off of superficial epithelium, but no exposure of the corium, such as occurs in foot-and-mouth disease. A like condition was more or less observable on the lips and gums forwarded (except in the case of one set of lips where the abnormalities were evidently due to injuries produced by the animals' teeth).

Meantime, the places in the Counties of Armagh and Tyrone where the twenty-seven cattle belonging to the dealer had been obtained, were again visited by the Department's veterinary inspectors, and, on a farm near the town of Armagh, where one of the five cattle said to have been affected with foot-and-mouth disease had come from, it was discovered that in the mouths of four of the seven cattle grazing thereon patches of superficial epithelium were peeling off, presenting conditions practically identical with those regarded as foot-and-mouth disease at Birkenhead. The lesions were seen in different stages. Brown-coloured markings first appeared on the surface of the tongue, and from these markings thin layers of superficial epithelium peeled off in patches, but no vesicles were formed at any time, and no soreness of the tongues or other parts of the mouths was noticeable. (It was ultimately observed that the superficial layer of epithelium completely peeled off the tongues of the animals.) No feet lesions were present. There was a complete absence of any constitutional disturbance, and the animals appeared to be in no way inconvenienced by this trifling ailment. Four cattle from the farm in question had been shipped on the occasion to Birkenhead. One of these four animals was originally bought from another farmer in the district, and it was discovered that on this man's land also this peculiar condition of the mouth existed among his cattle.

There were strong grounds to conclude that this ailment, although not being foot-and-mouth disease, was of a contagious character, and in order that further corroborative evidence might be obtained to negative the possibility of it being foot-and-mouth disease, experiments on other animals (including swine) susceptible of foot-and-mouth disease with material from the mouths of the affected cattle were decided on. In these experiments

Professor Mettam, M.R.C.V.S., co-operated. These experiments produced, in the mouths of the cattle inoculated, conditions similar to those described above as occurring on the farm near Armagh, but no lesions of foot-and-mouth disease resulted, nor were there any constitutional symptoms of illness. The actual organism causing this condition in the mouths of the cattle was not discovered, but experiments with a view to its discovery are being continued.

Foot-and-mouth disease is an eruptive fever characterized by the production of vesicles, and it is important here to emphasize the fact that no fever existed and no vesicles were present in the case of the naturally infected animals, nor in those infected by artificial means on the farm near Armagh.

The existence of this ailment among cattle in the County of Armagh, and its identity with the condition observed in the animals said to have been affected with foot-and-mouth disease at Birkenhead, was brought under notice of the Board of Agriculture and Fisheries, who were invited to send one of their veterinary officers to Armagh to investigate the subject on the spot. As a result, one of the Board's principal veterinary inspectors arrived at Armagh on January 1, and after investigation he concurred in the views of the Department's veterinary officials that the ailment in question was not foot-and-mouth disease.

Owing to the prohibition of the exportation of cattle from the port of Derry, consequent on the supposed discovery of foot-and-mouth disease among animals at Birkenhead, cattle intended for shipment alive from Derry were slaughtered at the public abattoir in that city, and their carcasses, as well as offal, forwarded to Glasgow. On December 10, certain tongues of cattle slaughtered in these circumstances were shipped from Derry to Glasgow, and on the 12th of same month the Board of Agriculture and Fisheries telegraphed to the Department that their Veterinary Inspector at Glasgow was sending to their laboratory "three heads of Irish cattle brought over dead, apparently recently suffering from foot-and-mouth disease." A further telegram was received from the Board on the following day in reference to these heads, to the effect that their Chief Veterinary Officer was of opinion that the lesions were those of foot-and-mouth disease. On receipt of the first of these telegrams immediate steps were taken to locate the farms from which the three

animals as well as ninety other cattle came, it having been ascertained that all of them belonged to the same consignment and were slaughtered at Derry. The ninety-three cattle, it was discovered, had been kept on several farms in the Counties of Derry, Fermanagh and Leitrim, and these were located without delay, but it was impossible, owing to the absence of any information as to which cattle of the lot the three tongues actually belonged to, to locate definitely the place or places from which the three animals had been taken, but they had been moved from some of the farms located. Searching inquiries were at once made as to the possible existence of foot-and-mouth disease on any of these places, or in the neighbourhood of same, and a large number of animals were examined on the lands, but with a negative result.

At the request of the Department, the Board of Agriculture and Fisheries forwarded to Dublin the three tongues (with parts of jaws) which had been received from Glasgow. On arrival the three tongues and such parts of the lips as remained were examined and found not to exhibit lesions of foot-and-mouth disease. The conditions on the tongues were identical with those observed in the case of the cattle shipped from Newry to Birkenhead on December 3, and with the affected animals in the County of Armagh, as already referred to.

The lesions observable on the tongues and lips of the Newry-Birkenhead and Derry-Glasgow cases showed characteristics entirely different from those seen on the tongues of the two cattle from the County of Meath slaughtered at the port of Dublin and mentioned in the preceding cases.

D. S. PRENTICE.

APPENDIX B.

REPORTS ON EXPERIMENTS CONDUCTED IN CONNECTION WITH THE SUSPECTED OUTBREAK OF DISEASE IN COUNTY ARMAGH.

In connection with the condition observed in County Armagh and which is identical with that found to exist on the tongues, gums and lips of the cattle shipped from Newry to Birkenhead, and the heads of cattle forwarded from Londonderry to Glasgow, it was deemed desirable to demonstrate by experiments that the affection concerned was not foot-and-mouth disease. These

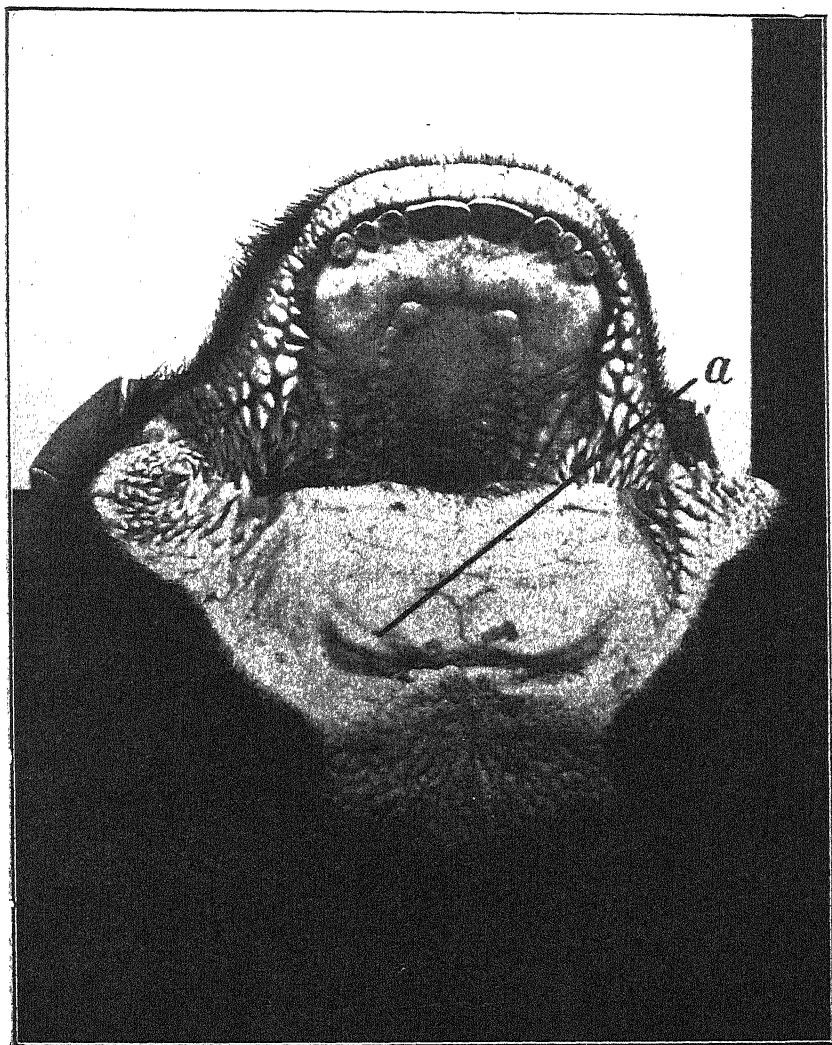
experiments commenced on December 17, and were carried out principally by Mr. Norris, M.R.C.V.S., with the co-operation of Professor Mettam.

(1) Preliminary Report by Professor Mettam.

By instruction of Mr. Gill, Secretary to the Department of Agriculture and Technical Instruction for Ireland, I, on December 16, accompanied Mr. Prentice to Armagh, and on the morning of the 17th examined a number (seven) of animals on Mr. Baxter's farm at Luggyvallen, Armagh. These animals had been in contact with an animal seized at Birkenhead and declared infected with foot-and-mouth disease. I found to all appearances the animals to be in good health; they were feeding and thriving, there was no lameness, no salivation, nothing to attract attention. The animals were "mouthed." Five of the animals showed more or less loss of epithelium from the tongue or the upper gum or from both. The epithelial loss was quite superficial, being removed in flakes, which were of a dirty yellow-brown colour. The epithelium could be removed readily by the finger-nail. The flakes were perforated with minute apertures, through which the papillæ of the tongue had passed. There was no soreness of the tongue or gums. The corium or connective tissue was not exposed. There was no congestion. The temperatures of all the animals were taken and found to be normal. I do not hesitate to say these animals are not infected with foot-and-mouth disease, and since the first examination I have seen and examined these animals on three further occasions, and the subsequent examinations confirm the opinion formed on the first inspection.

I also examined, and have re-examined, four animals belonging to Mr. Lynas at Ballygassoon, affected with a similar condition of the lining of the mouth. These animals are in the best of health, feeding and thriving. There is no salivation, no lameness, no elevation in temperature, no depression. These animals are certainly not infected with foot-and-mouth disease.

Further, the above opinion has been confirmed by certain experiments which have been carried out, details of which will be supplied later and when completed. (The experiments have been made upon young cattle and swine. Similar experiments are now proceeding in sheep. The condition of the mouth has been reproduced in every detail, and there has been no



(NEWRY-BIRKENHEAD CASE.)

Portion of the mouth of a bullock shipped from Newry to Birkenhead on December 3, 1912.

a, part of dental pad and lip from which a thin layer of superficial epithelium has been removed.

constitutional disturbance, and nothing developed suggesting that the infection is foot-and-mouth disease, not even the production of the vesicles.)

I have also examined the specimens forwarded to the Department—tongue and lips of one animal, and subsequently the lips of four animals from Birkenhead—and in my opinion the condition found is precisely similar to that found in the animals examined in Armagh. In one set of lips, however, the lesions observed were injuries due to the teeth.

(2) *Report by Professor Mettam and Mr. Norris.*
Nature of the Disease.

Before describing the experiments it might perhaps be well to briefly give an outline of the lesions and nature of the disease met with in County Armagh.

The lesions appear on the mucous membrane of the lips, the dental pad, and on the tongue. In no case have lesions been seen on other parts of the body, and where they have been extensive upon the lips advancing towards the hair-bearing skin, they have not extended upon the skin. The lesions are therefore apparently limited to the mucous membrane of the mouth.

The Lips.

Upon the lips exfoliation of the epithelium is observed. The size of the lesion varies as does its outline. It appears very rapidly, generally about the size and shape of a kidney bean, and gradually extends. The superficial epithelium is lost, and bordering the lesion an irregular ragged fringe of loosened epithelium, outlined by a dark brown line, limits its extent. The lesion may commence anywhere upon the mucous surface, but generally near the commissures or angles, and then extends across towards the middle line. It may extend upwards towards the junction of skin and mucous membrane and even on to the muzzle, the lesion then becoming roughly triangular in outline, but it does not extend upon the skin. It must be emphasized that the loss of epithelium is superficial. The shreds are as thin as cigarette paper. There is no exposure of the corium or connective tissues, there is no pain, tenderness or soreness, or congestion. Never at any time was any vesicular eruption seen on the lips, merely this superficial epithelial loss and the dark brown line marking the limits of the lesion.

Similar lesions may be observed on the pad, but the exfoliated epithelium appears to be somewhat thicker than that seen on the lips. Exceptionally, the lip lesion may extend backwards upon the mucous membrane of the cheek, just within the commissure or angle of the mouth. In no case was a typical lesion seen on the mucous membrane of the lower lip.

The Tongue.

The lesions on the tongue commence as brownish, even dark brown spots, on the mucous membrane, generally circular in shape, and in size from a threepenny piece to a sixpence. They may arise in any part of the dorsum of the tongue, usually at about the junction of the fixed and free portions of the organ. The brown spot increases in size, and is but slightly elevated above the general level of the mucous membrane. There is no vesicular eruption. There is no fluid beneath the dark spot. The epithelium gives way and is removed in thin flakes perforated with apertures through which the papillæ passed. If a number of lesions have developed, they become confluent and then an irregular area or several irregular areas from which the epithelium has been lost may be observed on the same tongue. The lesions generally extend towards the tip. No lesions have been found posterior to the bulbous swelling of the tongue. It also extends laterally, but apparently not to the under surface of the tongue. The last epithelium to persist is that covering the large papillæ on the dorsum about an inch posterior to the tip of the tongue. The lesion only affects that portion of the tongue carrying horny papillæ. The epithelium is easily removed during handling of the tongue; adherent or partially detached flakes may readily be taken away, and they resemble on a small scale pieces of perforated zinc. In time the whole of the dorsum and sides of the tongue lose the horny epithelium, and the tongue becomes remarkably soft and clean, resembling the tongue of a newly-born calf. Before the tongue reaches this condition, however, and before it has lost all the covering epithelium, dirty brown lines, somewhat raised, running in different directions, may be seen. These are the remains of the old epithelium at the confluence of the lesions, and sooner or later they are removed. The time required for epithelium to be removed entirely is about from ten to fourteen days, or less. Apparently the tongue may again

become re-infected. Cases have been noticed where the brownish spots have re-appeared on a tongue from which the horny epithelium had been removed. The spots evidently were of the same character as those occurring during the primary infection, but they are not so well marked and do not spread to the same degree.

The majority of animals affected are two years old or under, and there is some reason to believe that adult animals are not attacked to the same extent. There are no clinical symptoms. The animals do not salivate. There is no smacking of the lips, soreness of the mouth, nor lameness. To all appearances the animal enjoys normal health. There is no rise in temperature, and the appetite and rumination are in no way interfered with; in fact, the condition is only detected when the mouth is opened and examined.

From the nature of the infection—its course and its results—it is apparent that the condition is one of little importance, and that veterinary practitioners are seldom or never called in to treat it.

The Experiments.

The infective material used in these experiments was obtained from two separate farms, and, for the purposes of reference, the material from one may be designated virus "X" and that from the other virus "Y." Fortunately, ample accommodation for carrying out the experiments was available on one of these farms. The primary object in view was to determine whether the affection observed in the animals in County Armagh was foot-and-mouth disease or not, and, for that purpose, the following experiments were carried out:—

Experiment A.—Four young calves from 4 to 5 months old were, on December 17, inoculated in the following manner with virus X:—

The virus was obtained by scraping the tongues and removing the loosened epithelium by means of a Volkmann's spoon. The material thus obtained was rubbed down in a mortar with sterile normal saline solution. The emulsion obtained was then filtered through ordinary filter paper to remove coarse particles which might block the needles.

Calf 1 received 3 c.c. of the emulsion directly into the jugular vein. This animal remained in normal condition until the sixth

day after, when a slight superficial lip lesion was noticed. On the eighth day some lesions appeared on the tongue. These lesions in no way resembled those seen in foot-and-mouth disease, but were identical with those described in the earlier part of this report. The lesions progressed over almost the entire mucous surface of the upper lip and on the dorsum of the free portion of the tongue. The animal was slaughtered on the twelfth day for the purpose of obtaining its tongue and upper lip as museum specimens. This animal did not develop the mouth lesions as a result of the intravenous inoculation, but from repeated manipulation of the mouth by soiled hands subsequent to the inoculation.

Calf 2 received 3 c.c. of the same emulsion as Calf No. 1, directly into the peritoneum. This animal remained in normal condition until fifteen days after, when brown spots were distinctly noticeable on the tongue, and lip lesions appeared about the same time and extended on to the dental pad. The lesions in no way resembled foot-and-mouth disease, and by the twenty-fourth day after inoculation the lesions had practically disappeared. Like in the case of Calf 1, the mouth infection doubtless occurred from the handling which the animal was subjected to during the necessary manipulations for examination.

Calf 3 was inoculated by rubbing the emulsion used in Calf No. 1 upon its scarified upper lip and pad. Four days afterwards typical brown lesions appeared on this animal's tongue. Lip lesions appeared on the fifth day. The lesions progressed in the usual way. The animal was slaughtered on the tenth day after inoculation, to obtain its tongue and lip as museum specimens.

Calf 4. This animal's tongue was scarified on the dorsum and also on the under surface of the organ, and the emulsion rubbed into the scarification wound. Three days afterwards lesions were found on the dorsum of the tongue in the neighbourhood of the scarification wound. Lip lesions appeared a day or two later. The lesions progressed and by the fourteenth day after inoculation the superficial epithelium was completely exfoliated from the tongue and lip. Faint secondary lesions appeared on the tongue afterwards.

No attempt was made to isolate these four calves or keep them separate. They were allowed to freely mix and feed from a common supply. They were frequently handled after other animals suffering from the disease, no precautions being taken

to prevent transmission of disease during manipulation, the sole object being to set up the disease in the calves. In no case, however, did anything arise, nor was there the remotest suggestion that the condition was foot-and-mouth disease, nor did the lesions produced resemble that affection in any of its salient characteristics.

It having been determined that the disease was inoculable, and that the lesions were confined to the mouth, it was resolved to continue the experiments in other cattle, and in sheep and pigs.

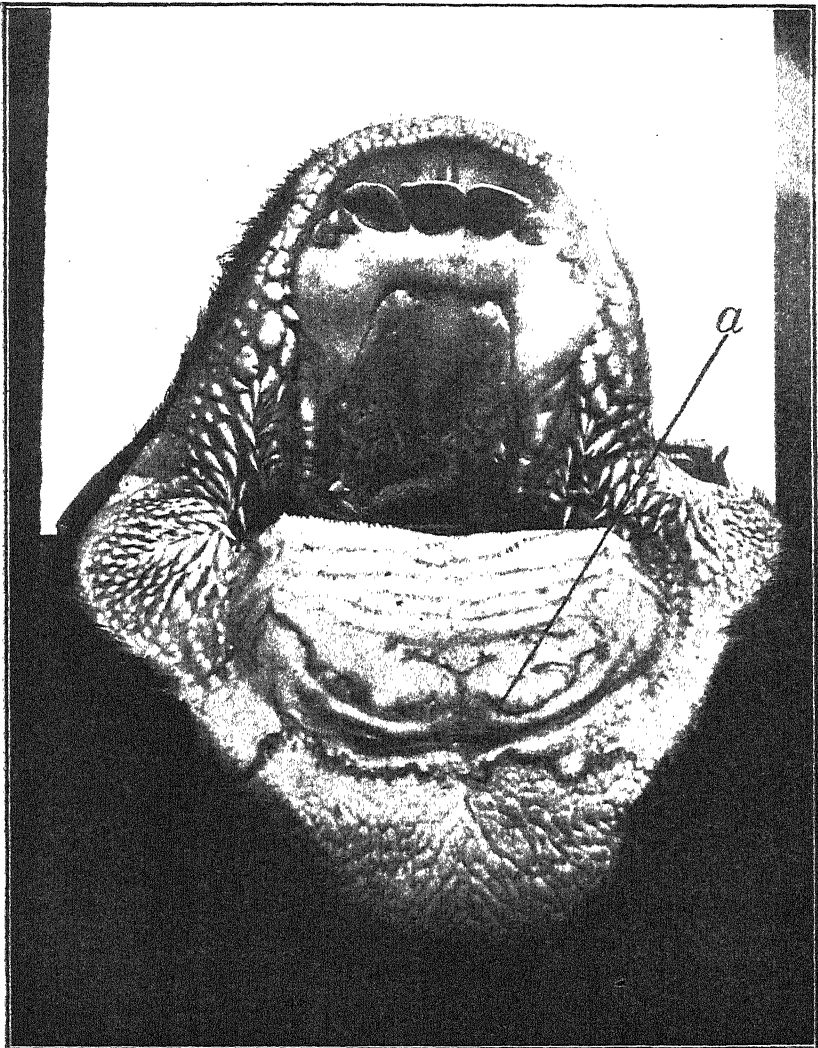
Experiment B.—Two yearling cattle (Nos. 5 and 6) and one pig (No. 1) were, on December 21, inoculated by rubbing the upper lip, pad and tongue of each of the cattle, and the palate and tongue of the pig, with sandpaper impregnated with virus Y. In the case of the two cattle, lesions appeared on the tongues and lips about the fourth day after inoculation. The lesions were characterized by superficial exfoliation of epithelium, and did not resemble foot-and-mouth disease. In the case of the pig no reaction whatever occurred, although the animal was kept under close observation for three weeks afterwards.

Experiment C.—Two yearling cattle (Nos. 7 and 8) and one pig (No. 2) were inoculated on the same day and in the same manner as the animals in Experiment B, with material obtained from the lesions set up in Experimental Calf No. 4 (virus X). Lesions appeared on the lips and tongues from the third to fifth day in the case of the cattle. These lesions were not those of foot-and-mouth disease, but simply showed superficial loss of epithelium.

In the case of the pig no reaction whatever was shown, although the animal was carefully examined every day for three weeks afterwards.

Experiment D.—Two young sheep (Nos. 1 and 2) were inoculated by having their tongues, lips and palates rubbed with sandpaper saturated in virus X and Y. In the case of Sheep No. 1, virus X from Experimental Calf No. 4 was used, and in the case of Sheep No. 2, virus Y from Experimental Animal No. 5. No reaction whatever was noticed in either of the sheep, although they were kept under observation for sixteen days after the date of inoculation.

Experiment E.—As the virus of foot-and-mouth disease is ultramicroscopic, and so small that it will pass through a fine



(NEWRY-BIRKENHEAD CASE.)

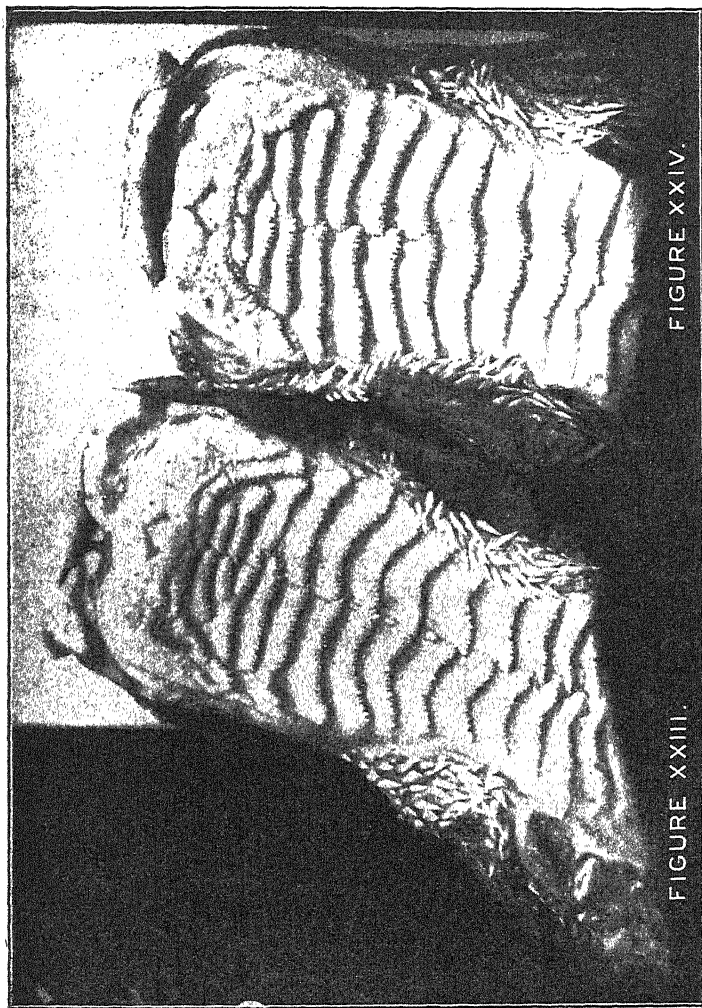
Portion of the mouth of a bullock shipped from Newry to Birkenhead on December 3, 1912.
a, part of dental pad and lip from which a thin layer of superficial epithelium has been removed.

porcelain filter, an experiment was made to see if such a filter would retain the virus of "Armagh disease." Accordingly scrapings were taken from lesions of the latter disease (which had already proved to be infective by inoculation), macerated with normal saline solution, and the emulsion passed through a Berkefeld filter. The filtrate thus obtained was then used to inoculate the lips and tongue of Calf No. 9. This animal was kept under daily observation for fourteen days afterwards, but no lesion whatever resulted from the inoculation, thereby proving that although the virus of foot-and-mouth disease is a filter passer, the virus of Armagh disease is not.

It having been proved by the foregoing experiments that the disease was easily transmissible to healthy young bovines by direct inoculation on the mucous membrane of the mouth, further experiments were designed to test the contagiousness of the condition by association of healthy with affected animals.

Experiment F.—Two healthy calves (Nos. 14 and 15) were placed in two separate stalls with two animals (Nos. 17 and 16 respectively) showing lesions of Armagh disease. The healthy and affected animals freely mixed together, and fed from a common supply, every opportunity being given to the healthy animals to contract the disease by association, if such were possible. On the ninth day of the experiment very slight lip lesions appeared in calves Nos. 14 and 15, and persisted up to the twenty-first day, when they had completely disappeared. The lesions were at no time well marked, and no tongue lesions were observed in either animal, although they were kept under observation for three weeks.

Experiment G.—Another experiment was carried out by placing two healthy calves, Nos. 12 and 13, in a field with eight affected animals showing mouth lesions in various stages of development. It should be pointed out that the field on which this experiment was made had been carrying animals affected with Armagh disease for some weeks previously. Typical well-marked lesions of the disease appeared on the lips and tongues of calves Nos. 12 and 13, on the eleventh and twenty-fifth days, respectively, of the experiment. In reckoning the results of this experiment it must be remembered that it was not a simple "association" experiment of affected and healthy animals; there are additional factors to be considered, in that it was possible



(DERRY-GLASGOW CASES).
Dental pads and portions of palates and lips of two cattle slaughtered at Londonderry and sent to Glasgow on December 10, 1912. (The lips have been partly cut away in process of dressing.) The parts are devoid of Foot-and-mouth disease lesions.

that the healthy calves became affected from the previously contaminated pasture, or that the source of infection was in the pasture itself.

Conclusions.

From the above experiments it will be seen that thirteen cattle, two pigs, and two sheep were inoculated in various ways with the virus of this disease, and that in no case was foot-and-mouth disease set up. It will be observed that all the cattle which reacted showed typical lesions of the disease found among the cattle in County Armagh, and which were identical with those exhibited by the cattle condemned at Birkenhead.

It is very important to note that no reaction whatever occurred in the sheep or pigs, although these animals are highly susceptible to foot-and-mouth disease. Clearly, these experiments prove that the disease is not foot-and-mouth disease.

An endeavour was made to isolate the causal organism of Armagh disease. From cultures obtained from scrapings of lesions, various organisms were isolated and their pathogenic effect tried on susceptible animals. In all seventeen experiments were carried out. Six of these were with mixed cultures obtained directly from lesions. Nine were cultures of various *fungi* (including an *aspergillus*), one a culture of a micrococcus and one a culture of a bacillus. The results in all cases were negative.

STUDIES ON GROWTH: THE INFLUENCE OF DIET ON GROWTH, NORMAL AND MALIGNANT.

By CASIMIR FUNK.

(From the Department of Chemical Physiology, Cancer Hospital Research Institute, London.)

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THE idea of influencing the growth of tumours by diet is not a new one. Jensen pointed out in 1909 that the diet plays an important rôle in the growth of tumours, and especially in the formation of metastases. Haaland has found that mice kept on a diet consisting of cotton seeds, bread, oats, and milk were less resistant to an inoculated sarcoma than mice kept on a restricted diet of bread and oats. These results were corroborated and extended by Stahr, Moreschi, and Medigreceanu. Rous has

observed that mice kept on a diet of oats and rye-flour, maize, milk, and sugar in a quantity just sufficient to sustain life show a different behaviour when they are inoculated with tumours before or during this restricted diet. In the first case on animals with large tumours no effect could be noted; in the second case the growth of the tumour was slightly inhibited. These papers, however, dealt with the influence of diet as a supply of nutriment in general. Ehrlich's atreptic theory expounded in 1906 the interesting view that tumours require a specific food supply. Thus he considers that the reason why a mouse tumour fails to grow for any length of time in a rat is due to a lack of specific food supply. The important work of Osborne and Mendel, Hopkins, and recently McCollum and Davis, has taught us to regard the growth, besides being due to a supply of nutritive constituents in general, as due to a specific "growth substance." Early in 1913 I pointed out that these results, together with the gain in our knowledge as regards the vitamins, new important constituents of our normal dietary, cannot fail to produce some effect on the investigation of cancer, and described experiments in this new direction.

Since then two references in the literature dealing experimentally with the same subject can be found. The first paper is by Sweet, Corson-White, and Saxon, who have described some experiments on mice and rats on normal diet and such devoid of vitamins. The latter diet had undoubtedly an inhibiting effect in the case of mice, where the percentage of takings was decidedly smaller, the incubation period longer, and the tumours smaller than in the case of normal diet. On the contrary, when rats were used very little effect was noted. The second part of this interesting work seems, unfortunately, to contradict the above-mentioned results. The second paper was by Hopkins, which corroborates the results of the American authors. In his cases also the inhibition of the tumour growth was not a complete one. We see from these experiments that it is possible to inhibit the growth of tumours to a small extent, and a question arises whether this could not be applied for therapeutic purposes. We must state here from the beginning that this is as yet hardly possible, and the reasons for these conclusions will be discussed in this experimental paper.

I have recently found that the diet used for the inhibition of

growth, which consists of caseinogen, starch, sugar, fat, and salts, produces in pigeons typical beriberi, and therefore must be regarded as devoid in vitamins. A similar diet can be obtained by using polished rice or a food sterilized in autoclaves at a high temperature. We know, however, that such a diet would unavoidably produce in man in the first case beriberi, in the second case scurvy.

Lately I succeeded in arresting the normal growth of young chickens for the first time on a diet containing vitamins—namely, on red (unpolished) rice—a statement which will be corroborated in this paper. Here was a new hope for influencing the tumour growth without danger of producing a deficiency disease. I therefore inoculated the chickens arrested in growth with Rous's sarcoma, a very virulent chicken tumour which takes in nearly 100 per cent. The result was that the tumour grew undoubtedly more slowly, and was smaller in size than in controls on normal diet. The chickens died sooner than those not inoculated, although no metastases were found, which are very frequent in Rous's sarcoma, an observation which might, perhaps, suggest a greater avidity of the tumour for the food than that of the normal tissues. It seems, therefore, that the growth of tumours and the normal growth of young animals are, although to some extent analogous, not quite identical. The tumour seems to have a much more active metabolism, its avidity for food is greater than that of a normal tissue. These experiments must be considered as a series of orientation experiments in an endeavour to influence the tumour growth by diet. At the present time they do not admit of a practical application, but they suggest that, especially in cases of a quickly growing but not very malignant tumour, such a diet might have some slight inhibitory effect on the rate of tumour growth without producing a deficiency disease.

This work is being continued on broad lines to ascertain the influence of the various constituents of food on tissue growth.

EXPERIMENTS.

In my first communication on the same subject I have described some experiments on 14-day-old chickens (Plymouth Rocks) in which I have arrested growth completely by means of an exclusive diet of red (unpolished) rice. The longest time it

was possible to keep alive these stunted chickens was two months. A photograph (see figure) illustrates very well the size of such chickens compared with that of those on normal food. The addition of white bread to the red rice had no effect on the growth of the chickens. I hope to be able to keep the chickens with arrested growth alive for longer periods by a slight addition of some foodstuff to the diet.

Experiment 1.—In my first communication the results of tumour inoculation in chickens with arrested growth were not



Showing the arrest of growth in a chicken fed on red (unpolished) rice.
Age of chicken, 2 months.

recorded. In this experiment eighty-four chickens were used, which were divided into seven batches—namely:—

- | | | | | |
|----|----|----------|--------------|---|
| 1. | 12 | Chickens | on red rice. | |
| 2. | 12 | " | " | { Inoculated after 33 days of the diet with Rous's chicken sarcoma. |
| 3. | 12 | " | " | { With addition of the same sarcoma extract to the food. |
| 4. | 12 | " | " | { Addition of sarcoma extract, and inoculated after 33 days of this diet with the tumour. |
| 5. | 12 | " | " | { Addition of yeast to the diet, and inoculated after 33 days. |
| 6. | 10 | " | " | Spratt's chicken food. |
| 7. | 9 | " | " | " " " " " Inoculated after 33 days. |

The result of the inoculation will be seen in the next table:—

Number of batch	Number of chickens alive at the time of inoculation			Number of birds bearing tumours			Diameter of tumour
2	5	...	...	...	$\frac{3}{4}$ cm.
4	5	...	2	...	$\frac{1}{4}$ cm.
5	7	...	5	...	1 cm.
7	9	...	8	...	3.7 cm.

In all these cases except the last no metastases were observed. From this experiment we see very clearly the effect of the addition of Rous's sarcoma and yeast to the diet of red rice, and the fact that no metastases were found must be especially emphasized.

Experiment II.—For this experiment sixty-seven 14-day-old chickens (Plymouth Rocks) were taken, the initial weight of which was 60 grm., in contrast to the previous experiment, in which 80 grm. was the average. They were bred late in the season, and were much more delicate and more difficult to keep alive. The chickens were divided into four batches, one of which was inoculated with the chicken sarcoma on the ninth day of the diet, instead of the thirty-third as in the previous experiment, a time in which the stock of vitamins from the food previous to the experiment could hardly have been completely used up, a fact which accounts largely for the results obtained. The results of the second experiment are summarized in the following table:—

Days	Not inoculated				Inoculated			
	Number of chickens living		Average weight		Number of chickens living		Average weight	
0	...	24	...	58 grm.	...	24	...	60 grm.
4	...	24	...	59 "	...	24	...	62 "
8	...	24	...	50 "	...	24	...	58 "
12	...	17	...	53 "	...	20	...	52 "
16	...	11	...	67 "	...	4	...	58 "
20	...	10	...	60 "	...	3	..	57 "
24	...	5	...	66 "	...	2	...	55 "

In all the inoculated chickens a tumour developed, except in four which died early. This shows that a diet consisting of red rice for nine days previous to inoculation does not prevent the tumour taking, and the growth of the tumour does not influence the growth of the chicken. But the *post-mortem* examination has shown that the tumour was in all cases, except two where it reached the size of $1\frac{1}{2}$ cm., extremely small, and measured only $\frac{1}{2}$ cm. on the average. Here, as in the previous experiment, no metastases were observed. The death-rate of the chickens inoculated between three to eight days was a very great contrast compared with the controls.

In another two batches the influence of the addition of phospho-tungstic filtrates from rice polishings and yeast and the influence of the isolated yeast vitamine was also studied with a view to ascertain in which fraction of these foodstuffs the growth vitamine is to be found. The results are recorded in the next table:—

Number of chickens	Days of Experiment	Average weight	Nature of addition	Number of chickens	Days of experiment	Average weight	Nature of addition
9	0	58 gm.	PWS-filtr., yeast	10	0	58 gm.	Phospho-tungstic acid filtrate from rice polishings.
9	4	56 "	"	10	4	58 "	
9	8	59 "	"	10	8	59 "	
9	12	55 "	"	10	12	53 "	
9	16	55 "	Vitamine 2-5 mgr. daily	8	16	58 "	
8	20	57 "	—	8	20	61 "	
4	42	65 "	—	5	24	60 "	

In this experiment the addition of the phospho-tungstic acid filtrates was given instead of water and the vitamine injected intramuscularly. The result obtained shows that the phospho-tungstic filtrate fraction from foodstuffs is not likely to contain the growth vitamine, and suggests that the latter substance is likely to be chemically different from the beriberi vitamine. A slight effect was, however, observed as regards the time that one was able to keep the young birds alive.

Experiment III.—The next experiment was performed with the view to determine the influence of vitamine-free diet on the growth of Rous's sarcoma in chickens. As vitamine-free diet polished rice was chosen; the inoculation was made sixteen days after the beginning of this particular diet. Of twelve animals taken for the experiment, of which eleven were alive at the time of the inoculation, five showed tumours $\frac{1}{2}$ cm. in diameter, with the exception of one tumour which reached the size of 3 by $1\frac{1}{2}$ cm. In none of these cases were metastases found.

Experiment IV.—The same experiment was repeated on a larger scale, controls being used which were fed on polished rice, with a small addition of yeast. For this experiment fifteen chickens (Plymouth Rocks, as in the previous experiments), aged 3 months, were used and were inoculated eight days after the commencement of the particular diet. The result was the follow-

ing: Of fifteen chickens fed on polished cooked rice only, inoculated, none developed a tumour. In the case of addition of yeast, of thirteen chickens alive at the time of the inoculation, from the same tumour as the polished rice birds, eight developed tumours varying in size from 1 cm. to 3 cm. without showing traces of metastases. Experiments on rats inoculated with Jensen's sarcoma showed that a similar diet had identically the same effects as was observed in fowls inoculated with the Rous's sarcoma.

This whole experiment shows undoubtedly the great influence of vitamine-free and vitamine-containing diet on the growth of Rous's sarcoma.

Experiment V.—The experiments of Murphy and Rous and Murphy have shown that it is possible to implant Rous's sarcoma into eggs containing chicken embryos and also in the eggs of pigeons and ducks. This shows that either the egg of any species is able to nourish the tumour, or that the embryo has not acquired yet the power of resistance to implanted tumours of foreign species. It was thought that one-day-old pigeons, having perhaps a store of embryonic substances, would be susceptible to Rous's sarcoma. Sixteen one-day-old pigeons bred in the institute were inoculated with Rous's tumour on the second day after their leaving the shell; none, however, have as yet developed a growth. The experiment is being continued.

ACTINOMYCOSIS OF THE MAMMARY GLAND IN DAIRY HERDS IN VICTORIA.*

By E. A. KENDALL, B.V.Sc.

Department of Agriculture, Melbourne.

MR. PRESIDENT AND GENTLEMEN,—Having been honoured with an invitation to submit a paper on so auspicious occasion as this is to the veterinary profession in Australia, I have been prompted to select as a subject that of "Actinomycosis of the Mammary Gland in Dairy Herds in Victoria." This was done for several reasons, the foremost being the apparent rarity of its occurrence in other parts of the world where the dairying industry has been

* Read before the Australasian Association for the Advancement of Science, at the Melbourne Meeting.

long and extensively established, the dearth of information as to its incidence, and the somewhat remarkable extent to which it is met with in this State.

That it is rarely met with elsewhere is indicated by the facts that only four cases, according to Le Blanc and Nunn, have been observed by Bang and Rasmussen, though the former saw fifty-three cases of mammary actinomycosis in sows in three months. Maxwell has seen eight centres of infection in one cow. Professor Mettam refers to it as uncommon. Jensen, however, appears to have met with it more extensively, as he mentions it as being of comparatively frequent occurrence; and it is recorded by Winslow as appearing in nodules or the miliary forms of actinomycosis.

The discovery of the prevalence of this disease in the udder in the dairy cows in this country dates from the inception of the local statute known as "The Milk and Dairy Supervision Act," which became operative in 1906. This Act was designed for the express purpose of enabling rational supervision of the health of the dairy herds as well as all dairying operations to be exercised by the Government. The staff charged with the carrying out of the provisions of the Act consists of dairy supervisors and veterinary inspectors. Amongst other duties the former make frequent periodical examinations of the cows supplying milk, particular attention being paid to the condition of the udders. Any departure from the normal state of this or other regions warrants the supervisor in prohibiting the use of the milk of a cow for fourteen days pending an examination of the animal by a veterinary officer. If no morbid lesion is present this officer removes the prohibition. If a disease, such as mammitis, for example, exists, he may extend the period of prohibition sufficiently long to enable recovery to take place; and in the event of some malignant lesion being detected, such as tuberculosis or actinomycosis, the prohibition is made permanent, and the cow is condemned for milking purposes and fire-branded. Though not necessarily summarily destroyed, a cow so prohibited and branded becomes, to all intents and purposes, the property of the State, the owner being held responsible for her safe keeping. In the event of a condemned cow being in a favourable condition for fattening for slaughter, the owner, subject to certain restrictions, may be granted the privilege of dealing with her in this

way, and she is subsequently killed under expert supervision, when a systematic *post-mortem* examination is made, and a report furnished thereon.

It is necessary at this juncture to point out that an actual diagnosis of the condition of the udder or other regions is not made by nor expected of the supervisor. He merely reports the presence of any abnormality. The diagnosis, therefore, rests with the veterinary officer solely. These facts are mentioned in order that no misconception may arise as to the qualification of the officer who is responsible for the diagnosis on which action as regards the future of the cow is taken.

I also desire to make it clear that, although a cow has been permanently prohibited and branded by the responsible official for some malignant disease, the statistics showing the number of cows, together with the particular diseases for which such action was taken, are not completed until the cow has been slaughtered and an autopsy performed. This is of great importance regarding the observations made as to the prevalence of actinomycosis in the mammary glands, because it removes any possible suggestion of error which would necessarily have to be considered if the diagnosis of the disease in some hundreds of cows was not subsequently confirmed on *post-mortem* examinations.

As might have been anticipated when inspections of dairy herds were systematically and thoroughly carried out on an extensive scale, a very large number of cows were temporarily prohibited for various conditions which necessitated veterinary examination, and a considerable proportion of these were so prohibited for udder troubles. The first impression received was that there must be a great deal of tuberculosis of the mammary glands in Victorian dairy herds, and, indeed, on subsequent examination by veterinary officers, this actually appeared to be the case, for there were a great many cows affected with nodular conditions in the udder which were in no small degree consistent with the general character of those of tubercular lesions in that region. So commonly were these nodules met with, and their existence doubted by the owners of condemned cows, that it was the practice at the outset, in order to afford instruction on their nature and significance and encourage early destruction of the cows, to have such cows killed in the presence of the owners,

so that the nodules could be demonstrated to them personally. The outcome of this procedure, though interesting enough from a pathological standpoint, was often disconcerting to the officers. Whereas the nodules, as a general rule, were comparatively easily revealed in the living animal, it frequently happened that they were not correspondingly easy to demonstrate when slaughter took place a few days or weeks afterwards. This naturally suggested that the nodules were certainly not tubercular, and that, whatever they were, a partial resolution appeared to have taken place in the interval. The former view proved to be correct; the latter was, however, soon dispelled, for on incising the nodules in numbers of cases the characteristic sand-like particles seen in actinomycotic nodules, surrounded with a small quantity of pus, were exposed. Further proof that these were truly actinomycotic was forthcoming when microscopical examinations of a number of sections of similar nodules were carried out by the Director of the Bacteriological Department of the University of Melbourne, Dr. R. J. Bull. It is hardly necessary to add that interest in the work of supervising the health of dairy cattle increased considerably as a result of the discovery.

Symptoms and Diagnosis.—As regards symptoms generally, I may say that, so far as outwardly visible signs are concerned, they are usually conspicuous by their absence. Beyond an enlarged or hypertrophied quarter or quarters of the gland in some instances, or an atrophied condition in others—neither of which is of material diagnostic value, as both occur as the result of mammitis—there is nothing to draw attention to the condition. Indeed, in a large number of cases there is no variation whatever in the external appearances of the glands. Diagnosis, therefore, depends mainly on palpation.

To examine a cow for the presence of these lesions it is necessary to adopt a regular line of action. The milk should be first withdrawn from the udder, and while maintaining the posture of the milker, each quarter of the gland is manipulated in detail. This is done by fixing them with one hand, and moving the fingers and thumb of the other upwards and downwards, forward and backward over the surface of the gland tissue. By this means the nodules are easily located, and diagnosis determined by their situation and character. In a typical case they will be found in the connective tissue surrounding the smaller cul-de-sacs of the

galactophorous sinus and acini, and when present in large numbers they are distributed fairly evenly throughout the greater part of the gland. Occasionally they appear to be situated much nearer the surface of the gland tissue, and can be felt almost subcutaneously. They vary in size from a leaden shot to a split pea, and usually stand out in prominent relief from the surrounding tissue. They are quite firm, and inclined to roll away from the fingers under slight pressure, and at the time when they can be detected with any degree of certainty there is practically no pain evinced on manipulation. In fact the impression received on feeling these nodules with the fingers and thumb may be aptly likened to that of a cow who had received a spreading charge of large leaden shot in the udder. This "shotted" condition is so characteristic in the majority of cases that the detection of mammary actinomycosis by the veterinary staff can fairly be claimed to have become second nature.

The most commonly affected regions of the udder are the two posterior quarters, and when the lesions are unusually extensive they may be found reaching almost to their very base. So far as the secretion of the affected quarters is concerned, provided they are not entirely atrophied, inert, or "blind," there is no material alteration in its physical properties. It may be less rich in fatty solids, and a smaller quantity is yielded, as is frequently the case with the so-called "weak" quarter after an attack of mammitis. From what has so far been stated in regard to symptoms and diagnosis, it might be too readily taken for granted that there is little or no difficulty in detecting this disease in the udder. It is, however, by no means easy in all cases. From an extensive experience in this work, I am convinced that we have yet to determine to what stage the pathological processes have reached by the time we can detect the lesions so certainly. I shall have more to say on this a little later. It will suffice here to point out that it is quite possible that these lesions have been in existence for some time previous to our finding them in the form of characteristic nodules I have just described. Their presence may have been disguised by some earlier inflammatory process with its attendant hardness and swelling. At all events, this possibility is recognized to the extent of sometimes withholding permanent prohibition pending a further examination later, when the nodules have assumed the more typical character, and can therefore be more certainly detected.

Differential Diagnosis.—The principal diseases of the udder which might be confused with mammary actinomycosis are fibrosis, mammitis, and tuberculosis. The first is distinguished by hardness and thickening of the connective tissue, which is linear, and more or less continuous in character, rather than interrupted and nodular. If the surface of the indurated tissue is studded with numerous convexities suggestive of nodules, it will be noted that these are strongly connected or linked together with bands of the connective tissue. They, as a matter of fact, more closely resemble tubercular conditions than actinomycosis, being somewhat irregular in size, larger and less sharply defined. They are doubtless old inflammatory foci left after an attack of mammitis.

Mammitis.—Parenchymatous and catarrhal.—Assuming for the moment that these diseases are themselves not connected with actinomycotic infection, as I shall discuss a little later on, there is little difficulty in differentiating them. The intense and almost uniform hardness and swelling met with in the former variety of mammitis cannot well be confused with the clearly defined, shot-like, or miliary nodules of actinomycosis. From the catarrhal form distinction is less easy, particularly in the convalescent stages, when the inflammatory foci in the galactopherous sinus, acini and milk ducts are very prominent and hard. These foci are, however, usually much larger than the miliary nodule of actinomycosis. Another rather useful distinguishing feature is the exhibition of a varying degree of pain or pressure in catarrhal mammitis, which is not usually appreciable in the case of the actinomycotic nodule.

From mammary tuberculosis actinomycosis is often difficult to distinguish. The affected portions of a tubercular mammary gland are, however, much harder in addition to being nodulated. The nodules themselves are large and less uniform in size and frequently more densely packed together. There is also, as a general rule, some evidence of accompanying lesions in the supra-mammary lymph glands, as revealed by their general increase in size, hardness, and also by their nodular condition. In actinomycosis of the udder these glands are very rarely altered in appearance in any way. In spite of these distinguishing characteristics, the line in some cases between the two diseases is so finely drawn that it becomes necessary to utilize the tuber-

cular test as an aid to diagnosis. When applying the test for this purpose, an important thing must be borne in mind. While the possibility of the nodules being tubercular would be at once eliminated on failure to obtain a reaction, it would not necessarily be proved that they were, because a cow with a nodulated udder did react. It might so happen that reaction was due to a deep-seated tubercular lesion elsewhere and the cow was free of similar lesions in the suspected udder. The inference to be drawn from this is that either the nodulated condition is merely due to indurated gland tissue, or, what is by no means unlikely, actinomycosis.

Except that it is obviously more creditable to be able to diagnose the character of the lesion localized in the udder, it does not greatly matter whether they are tubercular or actinomycotic; permanent prohibition follows in either case. A cow reacting to tuberculin is also condemned for milking purposes irrespective of where the lesions are situated.

Post-mortem Appearances.—On removal of the skin of an affected udder there is little to be noted other than the altered conformation of the glands in some instances; in others there is no departure from the normal. When an incision is made into the invaded tissue, however, the nodules, though usually appearing smaller than the impression received of them when manipulated *ante-mortem*, stand out quite distinctly from the cut surface. It will also be observed when the tissue is being incised that the nodules escape injury unless very thickly clustered. When exposed to view they are hard and firm owing to the presence of a fibrosclerous wall. This wall is often more or less translucent, showing the appearance not unlike that of a small serous cyst. The tissue in the immediate neighbourhood of the nodule is generally little altered in consistence, though occasionally it may be indurated. On incising the nodules the typical yellowish or greyish-yellow sand-like particles of actinomycosis, together with a little pus, may be easily pressed out. Under the microscope these particles are found to be composed of the characteristic degenerated or involuted forms of the streptothrix actinomyces. They are even better demonstrated on examination of a section of the entire nodule stained by Blaut's or Gram's method. Along with the "clubs" are also commonly seen the coccus-like bodies, generally regarded as broken filaments of the fungus, and also some staphylococci.

I now come to what may be looked upon as one of the most interesting features in connection with the finding of these lesions in the mammary glands. To begin with, I should state that no compartment or quarter, or quarter of either right or left gland, is immune from invasion. Any one or all four may be involved. The two posterior quarters are, however, attacked with much greater frequency. Further, a comparison between the number of right posterior quarter infections and those of the left posterior region reveals an appreciable increase of the latter over the former. In support of these statements I purpose furnishing figures showing the total number of cows actually destroyed during the past $5\frac{1}{2}$ years which were found on *post-mortem* examination to have actinomycotic udders. I have expressly excluded a large number of cows permanently prohibited and branded for this complaint which have not yet been finally disposed of by slaughter in order to eliminate any suggestion of error in diagnosis. During the period mentioned 636 cows have been killed under supervision with actinomycotic udders. The proportions in which these were affected in regard to the individual quarter or quarters is as follows:—

Region.	No. of cows.	Percentage.
All four quarters ...	22	3·3
Both right „ ...	32	5
„ left „ ...	17	2·6
„ anterior quarters ...	5	·78
„ posterior „ ...	68	10·69
Right anterior quarter ...	41	6·5
Left „ „ ...	28	4·4
Right posterior „ ...	175	27·5
Left „ „ ...	248	38·99
Total ...	636	

It is necessary for the purpose of preserving due accuracy to mention that there were, in addition to the foregoing, a few cases in which there was what might be termed “cross infection,” that is to say, where the right anterior and left posterior, also left anterior and right posterior, were jointly involved, but the number was so small as to have no material bearing on the greater frequency generally with which it appeared in right as

compared with the left gland or anterior with posterior quarters; I have therefore not included them.

When an analysis of these figures is made one is at once struck with the great preponderance of posterior infections. If we take the total of these regions, that is to say, right and left individual posterior together with these cases where they were jointly affected, it will be seen that they represent no fewer than 491 out of a total of 636, or 77·2 per cent., whereas the two individual and joint anterior infections amount to only 74, or 11·63 per cent. With regard to two right and two left quarters infections, I think they may be reasonably left out of the calculations for the present, as they make little or no difference to the overwhelming majority of posterior.

Taking now the individual posterior regions only, it will be found that there were 178 cases in which the right one was involved, and 248 in the left. There is, therefore, an increase of 73 in the latter over the former, or 41 per cent.—a sufficiently wide margin to excite some comment.

Incidence of the Disease in the Udder.—Before offering some explanation of the peculiar significance of these figures, I will crave your indulgence while I endeavour to set out my views as to the circumstances connected more particularly with the incidence of this disease in the mammary apparatus of the cows in this State. One might be inclined to the view at first that the existence of so much mammary actinomycosis was due to generalized or secondary infection from some original source elsewhere in the tissues of the animal, notably, the maxillæ, pharyngeal region, lungs, &c. This theory is, however, quite untenable, owing to the fact that so far from the disease being commonly met with in any of the foregoing or other regions and the udder in the same animal it is quite the other way about. The mammary lesions, curiously enough, most frequently exist alone. The examination and original diagnosis in these 636 cows were made while they were in various stages of lactation. I do not, however, mean it to be inferred that the disease would not have been also found during the period while lactation was in abeyance. The probability is that there were and are as many cows not in milk affected as others, but it is not until another period of lactation commences that they come immediately under the notice of the supervisors and veterinary staff. In the case

of virgin heifers or any cows that have never borne calves, I do not think it is ever present, for reasons which I shall set out presently. Although I have just expressed the opinion that the disease is probably quite as prevalent in dry cows as in those in milk, I believe, nevertheless, that infection is very intimately associated with lactation; and so much so, that if the necessary physiological changes which result in the yielding of milk did not take place, it is not too much to say that there would be no such actinomycotic infection as that with which we are now dealing. The relationship between milk production and mammary actinomycosis may be explained in this way: There is no doubt that the so-called "ray fungus" is present on many of the cattle pastures in Victoria, as witness the extent to which actinomycotic lesions are met with in the mandibular and pharyngeal regions of cattle. Infection in these instances is undoubtedly due to portions of contaminated fodder plants wounding the soft tissues and even becoming embedded in them. It may, therefore, be reasonably assumed that any other part of a cow's body could readily become soiled on contact and actually infected if means of entry were found. With a cow in milk, what region is more likely to be exposed to infection than the mammary gland when in contact with the ground while the cow is in a recumbent position? It is not necessary that a wound shall be first inflicted, though undoubtedly there are many cases where external injury to the udder is followed by actinomycotic infection. The means of entry are already provided in the nipple itself.

The altered conditions of the udder as a result of preparation for the secretion of milk causes the lactiferous duct in the nipple to become more or less open or expanded, and when the cow is being milked the nipples are commonly moistened with milk, or it may be some other lubricant. When the operation is completed she is usually turned out to the paddock with moist or sticky nipples. She generally assumes a state of decubitus soon after being liberated, and infective material may readily adhere to the parts. It may thus gain access to the excretory duct, and by growth of the filaments reach even beyond the galactopherous sinus to the smaller ducts and acini of the gland, and thence to a more permanent home in the deeper connective tissue. I do not believe it to be essential in all cases that actual milk production

shall have commenced before infection can occur. The glands of cows of great milking propensities become greatly distended through springing for several days or weeks before parturition, and therefore their condition approximates that of the cow already in milk, in that the nipple is expanded and to some extent moist. Again, infection may just as easily occur in the case of cows being "dried off" when the gland is expanded through pressure of accumulated milk. Contrasting these circumstances with the barren dry cow and virgin heifer, we find that the orifice of the nipple is practically sealed up; the gland itself shrunk or undeveloped. Consequently invasion in the latter cases in the same way is impossible.

According to Muir and Ritchie, if we study the growth of the streptothrix actinomyces under artificial conditions, presumably because it can be seen best in this way, it will be found that filaments grow upward into the air. The protoplasm of these later becomes segmented and forms spores or conidia. Under natural conditions outside the animal body these conidia become centres for further filamentous growth. This being so it would seem quite feasible for similar processes to go on where the streptothrix or its filaments attach themselves to the orifices of the nipple, because in the presence of the moisture and warmth of the part it probably finds itself in favourable surroundings for growth. Seeking a continuance of such favourable conditions, growth could proceed along the milk duct into the interior of the gland and thence to the deeper regions. With the exception of the difference in the environment in the latter case as contrasted with that of natural conditions, it seems to me quite conceivable that the growth of the filaments and formation of conidia can proceed on similar lines to that occurring outside the animal body, for it must be borne in mind that, although it has reached the interior of the gland, until it is actually grafted to a part of the mucous surface, and invasion of the submucosa and connective tissue has begun, the fungus is, to all intents and purposes, as much outside the body as if it were absent altogether. The theory of invasion in this manner might be disputed, because microscopic examination of the invaded tissue shows that the seats of the lesions are not actually in the acini or milk duct, but rather in the neighbouring connective tissue. I do not think this theory can be thus effectually disposed of. If it is contended that there ought to be some evidence on examining a section microscopically of invasion through the mucous membrane and other tissue along which growth of the fungus has proceeded, the same contention ought to apply whatever has been the source of entry, as, for example, infected skin wounds in the region.

Indications of infection through skin wounds in the udder are just as deficient. My belief is that so long as there is practically no obstacle to the advancing growth along the mucous surface, such growth will proceed into the depths of the gland cavities till the fungus eventually grafts itself on the membrane in the more confined areas of the acini. Invasion of the surrounding connective tissue follows, and this in turn proceeds until some part more firm in texture is reached and the fungus becomes imprisoned there. To put this in another way, the filaments of the streptothrix sooner or later come to a "dead end," and their growth and formation of conidia are inhibited by the toughness of the surrounding connective tissue. They there set up tissue reaction resulting in the formation of the characteristic nodules of actinomycosis. The explanation of the absence of any lesions in the tissue invaded by the streptothrix *en route* to the parts where the nodules are eventually found is that a fungus so minute as the streptothrix may not dwell long enough in the tissues passed through to produce a reaction, and even if reaction did occur that it would be too infinitesimal to leave any discoverable trace.

Thus far I have been dealing with the possibility of direct infection of the normal udder. With a view to ascertaining whether it occurs as a sequel to some pre-existing morbid condition, I have on several occasions, when taking action, closely questioned owners and persons who know the history of the cow from birth upwards, and whose information could be relied on, as to the previous existence of any abnormal state of the udders. In some instances the reply was that nothing had ever been noticed amiss, and their first knowledge of anything unusual was gleaned from myself. Other persons remarked that the cow had had a weak quarter for some months previously, or that the quarter had been hard and painful for some time during the previous or present milking periods. This at least suggests that direct infection does follow other diseases in some cases, and that only comparatively slight disturbance is set up. On the other hand, the existence of some previous inflammatory condition in the same region indicates that the actinomycotic infection may take place as a result. It is a possibility that cannot be altogether dispensed with, because I have personally had under observation several cows originally temporarily prohibited by supervisors for mammitis. Prohibition was extended. Re-examination some months later revealed the existence of actinomycosis. One case in point was put aside for purulent mammitis on December 13, 1909. The cow was not seen again till October 28, 1911, when actinomycosis was diagnosed, the original

inflammatory lesions having almost entirely disappeared. She was finally killed on January 25, 1912, over two years afterwards, and *post-mortem* examination of the udder revealed well marked actinomycotic lesions. It may be reasonably supposed that if infection can occur in a normal udder, one damaged as a result of a purulent inflammatory process could still more easily be infected.

Actinomyces as a Cause of Mammitis.—There is yet another important feature to consider in regard to the relationship between mammitis and this form of actinomycosis. This is the likelihood that a mammitis indistinguishable by ordinary clinical methods from that commonly met with may really be the result of direct infection by actinomyces instead of being a predisposing cause of the latter trouble. Personally, I believe that this theory has much to support it, and that it cannot be dismissed as untenable. If we take the incidence of the disease in other regions, such as the jaw, we find that the characteristic lesions are there developed as a result of direct entry of some fungus—infected foreign substance; that in and around the actinomycotic tumour there are pronounced inflammatory or granulation tissue areas. The difficulty one experiences, however, is to estimate to what extent the inflammatory process and subsequent abscess formation are due to the presence of the fungus, and how far they are influenced by the presence of pus-forming cocci, for there is almost always abundant evidence of a mixed infection when smears or sections from a lesion are examined under the microscope. At all events, it does not appear rational to suppose that the inflammatory processes could be due to coccal infection alone; neither does it seem feasible that there would be no tissue reaction if the fungus was present without cocci.

It might therefore be held, with reason, that precisely similar inflammatory areas are actually set up in the gland tissue from entrance of the fungus by a natural opening instead of by a wound, and that the fungus subsequently grafted itself on the mucous lining of the acini or milk duct. So far as investigation has proceeded there would appear to be, however, a marked difference in the naked eye appearance of the two sets of lesions; whereas the actinomycotic tumour of the jaw or tongue is more conglomerate, or its nodules are more densely packed or blended together, the small, evenly-shaped, shot-like nodules in mammary actinomycosis are distinctly isolated, and stand out in bold relief from the surrounding tissue. Again, the tumour in the region of the head has a tendency to suppurate sooner or later. In the udder cases, while suppuration processes are present to a small degree in each nodule, there appears to be little tendency for them

to break away and discharge. The pus with the imprisoned clubs may remain inside the firm fibrosclerous wall of the nodule for an indefinite period—certainly for upwards of two years.

Thus far it would seem the pathological processes in the two forms of the disease were not identical; but I do not think it is by any means improbable that in a very large proportion of cases at least the characteristic inflammatory and pus-forming stages were actually present in the infected regions of the udder previously, and that they either passed away before the affected animal came under our notice with the typical miliary nodules, or that they escaped detection in an already acutely inflamed gland on account of its intense hardness and swollen condition and consequent difficulty of palpation. To put it another way, the case may have been recorded as ordinary purulent mammitis, when it was really the earlier stage of what should be termed actinomycotic mammitis. Further, though there was apparently no abscess formation, as in other regions, with subsequent evacuation through the gland tissue and skin, nevertheless, more extensive suppurative processes than we have so far seen may have occurred, and discharge already taken place by way of the galactopherous sinus through the main milk duct.

Still pursuing this line of reasoning, it is not irrational to suppose that consequent on escape of the pus, &c., the original lesion has, to all intents and purposes, healed, leaving the small well-defined miliary nodule with the firm fibrous wall containing the imprisoned clubs of the fungus, which we have found so abundantly, and which have been already described.

I regret that opportunities have been difficult to find for the purpose of following up these mammitis cases more closely, with a view to definitely deciding this important question of their causation by infection with the fungus. Other official duties, together with the fact that permanent prohibition and slaughter for *post-mortem* examinations cannot be carried out for mammitis alone under the Act, have militated against this work. However, I am not without hope that it will be possible to do more in this direction very shortly.

If I have not unduly taxed your patience thus far, I will now return to the figures of cases I have already quoted to you, and put before you reasons which I think in no small measure account for the predominance of posterior over anterior infection, *viz.*, 491 as against 74. In this respect I believe that the explanation will be found chiefly in the attitude assumed by the cow in decubitus. When a cow rests in the ordinary way the posterior quarters, particularly if well developed or very prominent, and the nipples are large, come much more in contact with the soil

and grass than is the case with the anterior. Even though all four compartments are well developed, there is less tendency for the anterior ones to be so exposed to infection, for the reason that the cow in decubitus is invariably resting with one hind leg partially extended under that part of the body, and consequently gives some support to the anterior quarters. Even though some part of these quarters is in touch with the ground, the direction of the nipples is readily altered to a forward direction by the leg and body, instead of downwards by the backward thrust given to the udder with the weight of the posterior region of the abdomen above and before it, and so keeps them from contact to a great extent.

With regard to the 41 per cent. of difference in numbers of individual post-quarter infections, *i.e.*, right and left, we must again look to the attitude of the cow when recumbent. You will recall the fact that I have stated my belief that infection is closely associated with the milking process. In this instance it is necessary to go a little further. It is well known, of course, that methodical dairy farmers endeavour to have their cows in full profit as long as possible, and one result of this is to put the cow to the bull again as early as deemed expedient after calving, in order that there will be as little time as possible lost between the cessation of one period of lactation and the commencement of the next. In many instances the cow is thus pregnant again very shortly after calving. Now, if one carefully observes a number of cows when comfortably settled down in a paddock ruminating under ordinary circumstances, it may be noted that the barren cow seems to prefer the right sterno-abdominal position of decubitus, presumably in order not to inconvenience the work of her capacious rumen, which she has no doubt very recently filled. On the other hand, if she is pregnant (and the further pregnancy is advanced the more marked is the tendency) she is more disposed to suffer some inconvenience, so far as her rumen is concerned, and adopt the left sterno-abdominal position, so that she may not expose the contents of the uterus to unnecessary harm by pressure and consequent displacement. It would be little short of gross exaggeration to say that all pregnant cows are so careful of their developing offspring as to adopt this procedure, for indeed they do not; but there is equally little doubt that a fair proportion of them possess this maternal instinct to an appreciable degree. I think, therefore, that this variation in the position of decubitus affords a feasible explanation of the difference in favour of left posterior infections.

Influence of Milk from Actinomycotic Udders on Consumers.

—Before concluding I desire to add some general remarks on the question of infection of persons or animals consuming milk from cows suffering from mammary actinomycosis. When it is remembered that there have been upwards of 600 cows destroyed on account of this disease, and others have been condemned, such a question most naturally arises. Up to the present there seems to be a considerable difference of opinion as to the probability of infection occurring from this source. Winslow is of opinion that the ray fungi may escape into the milk, which, if used for human consumption, may produce the disease. Jensen also thinks that man may be affected through the digestive canal, and that such a possibility of contagion must not be disregarded in controlling a milk supply. Mettam records that he is not aware of the organisms being found in milk, though I believe other observers have claimed the discovery of it in that product. Notwithstanding this, Mettam has no doubt that milk from an infected gland should be condemned; and in support of this he says that there are many cases of human infection on record, and that in most instances the disease enters by the alimentary tract. In some the infection was claimed to be direct, whereas in others the streptothrix was not evident. I have no knowledge of the statistics of cases in the human subject in this State which might be possibly attributed to the milk supply, but it is doubtful if they are, in any case, at all proportionate to the number of animals found affected. Even though the infectivity of milk from such a source were demonstrated, the danger would not appear to be really very great. Direct transmission by inoculation of material from an infected animal source is very difficult to attain, presumably because it is not easy to obtain the streptothrix in a satisfactory or suitable state for transplanting. Inoculation of human beings has, however, been traced to injuries to the mucous membrane of the lips and other parts of the digestive tract through persons chewing fungus-infected fodder plants (Kitt). It would seem that the environment the fungus finds itself in once it enters animal tissues inhibits its powers of successful transplantation direct to the tissues of other animals.

Dr. Gilruth has expressed the view that the clubs, being merely involuted or degenerated forms of the streptothrix, are incapable of being directly transplanted, and also that such involution process is largely influenced by tissue resistance, so much so that the greater the resistance to invasion by streptothrix the greater will be the club formation. This very probably throws some light on the almost entire absence of recorded cases of infection of the digestive tract of calves, which one would think

ought to be fairly common, particularly when it is known that it is the practice with a number of dairy farmers to put calves with cows after the more acute stages of mammitis have subsided.

In spite of the conditions which are said to militate against direct infection of man and other animals, it appears probable that the fungus, on escaping from the animal tissues and finding accommodation on a vegetable host once more, is capable of acquiring the faculty of reinfecting an animal when the conditions are favourable. Thus it is probable also that infected animals are capable of spreading infection by contaminating pastures. For this reason, and because of the possibility of direct infection, it would undoubtedly be inadvisable to lessen the restrictions or vary the action at present taken in regard to cows affected with this disease in this State.

A PLEA FOR VACCINE THERAPY.

By W. MORGAN SCOTT, F.R.C.V.S.

Bridgwater.

ARMED with my diploma and a fair knowledge of the actions and uses of drugs, I left college with the erroneous conviction that I possessed all the necessary essentials which go to make a successful general practitioner, and that I had only to diagnose my case, and prescribe a carefully selected base, adjuvant and corrective, and my patient would in due course recover. For some years this line of treatment was faithfully adhered to before experience taught me the way of escape from the fetters of a college training, and in looking through those early prescription books it is a surprise to me now that many of my patients survived the over zealous administration of drugs. As time went on I found my cases made better recoveries where drug therapy of a more simple and less aggressive character was adopted. Curative medicine is roughly divided into two distinct classes, allopathy and homœopathy, and the exponents of each naturally maintain their system to be the best. That drug therapy does occupy a position and sometimes an important one in the cure of bacterial diseases no one will deny, but that its action and uses are not to be compared with the natural forces already present in animal tissues we must all admit. Moreover, the very secondary position occupied by drug therapy accounts for the fact that the successful results obtained by the votaries of one line of treatment are equally secured by those who adopt another line of treatment, perhaps diagonally opposed. For example, we hear

of some practitioners adopting the sedative treatment in pneumonia with apparently good result, while others are carrying out the tenets of the stimulating treatment with an equally favourable termination. Another class of practitioner discards drug therapy *in toto*, and confines his energies to nutrients and good hygiene.

Again, take such a disease as tetanus. Here we find a series of cases treated on the most scientific principles giving a percentage of recoveries, and another series treated on the "do nothing" principle of treatment giving equally good results. It cannot therefore be claimed drug therapy is the *alpha* and *omega* of curative medicine. This being so, it must then follow that there exist in the animal body forces which are capable, independently of the skill of man, to battle against bacterial disease. These forces we now recognize as opsonins, agglutinins, precipitins, bacteriolysins, &c.

To assist Nature when she is unable for some reason or other to elaborate a sufficiency of these antibodies is the basis upon which all forms of curative medicine is built, and this man has done all through the ages, although in many instances the *modus operandi* has remained obscure, thereby giving another illustration of the many examples of practice preceding science. From what has been said it is apparent that drug therapy has very pronounced limitations, and I venture to think that the more these limitations are recognized the greater is the success assured to the practitioner. Let us notice briefly a few of the more common methods adopted in daily practice based upon our present day knowledge, and see how curative results are obtained.

Counter-irritants.—A rubefacient applied to the skin determines a greater supply of blood to the cutaneous and subcutaneous structures, and the older practitioners' theory was that by producing a superficial inflammation the pre-existing deep-seated inflammation was counteracted. We know now that a cutaneous inflammation determines an increased cellular activity, and the production of a greater supply of immune bodies which in specific visceral inflammation are necessary to thwart the progress of bacterial invasions.

Hot Fomentations and Poultices.—These have been used to combat disease from time immemorial.

The early practitioner believed that by their soothing influence they reduced inflammation. In the case of a local bacterial infection we find a spreading inflammation sets in caused by the endotoxins and exotoxins of the bacteria; phagocytosis, circulatory tension, coagulation, stasis and effusion take place: the

result is the part or parts are cut off from the general blood supply, and the bacteriotropic blood is unable to reach the infective foci. Here hot fomentations and poultices assist in dilating the capillary blood-vessels, relieving the tension and facilitating the transfusion of the antibody laden fluids, and in this manner renewed antibodies reach the bacterial foci to the detriment and destruction of the latter.

Stimulants.—There are no systemic stimulants capable in themselves of thwarting the destructive progress of pathogenic bacteria, but they may rouse tissue cells to increased activity in the elaboration of antibodies. Moreover, stimulants may and do sustain the vital organs, which in visceral infections where the excessive *accumulation* over *elimination* of toxins is feared. These toxins in themselves have a direct paralysing effect upon the cardiac and respiratory centres, not to mention the heart muscle itself.

Sedatives.—In superficial and visceral bacterial invasions with consequent inflammatory sequelæ such a sedative as aconite exerts at certain stages a beneficial effect upon the system in general by lowering the blood-pressure, beginning at the heart and extending to the arteries. This tends to lower the tension in the infective zone with the result that the body cells are restored to activity with a consequent increase of antibodies, while the body fluids are themselves given a better access to the focal area.

Eliminators.—During the development of all forms of the known pathogenic bacterial flora growing in or on the animal body toxins are produced derived from the bacteria themselves, and I am not sure if dead tissue cells do not contribute to toxæmia, particularly in such diseases, for example, as the carcinoma group.

Toxins in themselves are powerful depressors of the functional activities of the body cells, and their accumulation leads to cellular paralysis, cellular death and dissolution. To warn against such accumulation the practitioner must keep the eliminative channels free, *i.e.*, the bowels, kidneys, and skin: for the bowels an aperient, mag. sulph., or aloes; for the kidneys I know of no better agent than turpentine; and for the skin salicylate of soda, or better still salicylic acid. It will therefore be seen that eliminatives have a most important function to perform in bacterial invasions, and I think, so far as drug therapy is concerned, they should occupy the most important position in one's mind when prescribing for such cases with toxæmic symptoms. The foregoing is only a cursory glance at the limited influence drug therapy exerts in the treatment of bacterial diseases in general, and it is well for the clinician to keep these limitations before him.

Vaccine Therapy.—A bacterial vaccine may be defined as an albuminous substance made up of devitalized bacteria held in suspension, and when introduced into the animal body stimulates those tissues capable of elaborating antibodies. A vaccine, therefore, increases the natural resources which are existing in all living animals.

When living bacteria are introduced into the body there follows an immediate increase of antibodies, and it may here be asked, if this is so why does Nature fail in many instances to throw off the invading elements; in short, why is vaccine therapy necessary? There may be several contributory factors to account for this failure.

(1) The invading bacteria may be so numerous and virulent as to completely paralyse the immunizing mechanism. Anthrax is an example of this.

(2) An abundant supply of antibodies may be formed throughout the body, but owing to isolation of the bacterial foci, such as a purulent cyst, or the coagulation of a serous exudate, or the plugging of vessels with clot, these antibodies are unable to reach the infected zone. Quarter evil up to a certain stage is an apt illustration here.

(3) In the case of a local infection the area may be so isolated and incapable of producing antibodies itself, while the bacteria are unable in themselves to arouse other regions of the body more capable of elaborating immune bodies.

(4) The tissues of the body infected with bacteria may be so lowly vascular as to be incapable of responding to the bacterial stimulus. Examples of these are seen in the cartilaginous and ligamentous structures, *i.e.*, the poll, the sternum, and the lateral cartilages.

(5) Through some inherited or acquired defect the tissue cells in themselves seem incapable of responding to bacterial stimulus, with a consequent non-elaboration of immune bodies.

In the case of (1) the ideal treatment consists of administering an antitoxic and bactericidal serum.

In (2), where the practitioner is dealing with a cyst, this should be opened where possible and the cavity packed, after the walls have been curetted, with citrate of soda. This salt increases osmosis and prevents the coagulation of lymph. Here benefit can also be obtained by the internal administration of citric acid, and in local infections, as we have seen, hot fomentation relieves tension.

(3) In this condition the stimulation of antibodies is clearly indicated by the introduction of suitable autogenous vaccine.

(4) Here we have an opportunity of combining surgery

with vaccine therapy. The infected area should be laid open and the parts curetted, the cavity irrigated with weak warm boric lotion, and firmly plugged with chloride of sodium and citric acid.

(5) The greatest benefits here are to be derived from the repeated injections of polyvalent vaccines and sera.

So much for the responsive virtues of the tissue cells, vaccine administration, and the difficulties which may be encountered in daily practice. There are other important points which must not be overlooked, referring particularly to the vaccines themselves. Briefly, these are as follows:—

(1) A vaccine derived from a young culture is much more efficacious than if obtained from an old culture.

(2) Over-sterilization by heat detracts from the therapeutic value of the vaccine. The usual temperature advised is 57° to 58° C. for three-quarters of an hour. In many cases I have satisfied myself by sterilizing for half an hour at 55° C., and believe I have obtained a more efficacious vaccine.

(3) The dose is an important consideration. If it is too small little or no benefit will accrue, and it is well to remember a much larger dose will be tolerated in chronic than in acute infections. If the dose is too large the negative phase, on the other hand, with its consequent depression, may be so great as to hasten dissolution.

(4) In the case of a mixed infection a vaccine should be obtained from each variety of bacteria present, for it is obvious a streptococcal vaccine would be of no value in a streptococcal infection, and vice versa. It is well to remember also in a specific disease running a course where mixed infection is the rule one sometimes finds a secondary invasion of a fresh type of bacterium takes place, upon which the original vaccines will have no good effect. The practitioner, therefore, in the event of the case not making satisfactory progress, should make a careful examination of the *materies morbi* at intervals, and, if necessary, prepare fresh vaccines.

(5) *Autogenous* vaccines possess innumerable advantages over *stock* vaccines, and it is only in those very acute cases where the delay entailed in the making of an autogenous vaccine is dangerous that the use of a stock vaccine is, as a rule, justified. Moreover, those who employ stock vaccines only pander to empiricism. Even if we are fortunate enough to obtain a stock vaccine derived from bacteria of the same flora as the infection we desire to combat it does not follow the strain is the same, and, should this differ, the efficacy of the vaccine is greatly reduced. Take, for example, streptococci. Some strains of this bacterium are very

virulent, while others appear to be more or less inert, so much so, in fact, that one might almost say they were non-pathogenic. A vaccine made from the former strain would prove of excellent curative value, while from the latter no beneficial results could be obtained. From a series of investigations recently carried out, I have come to the conclusion that the nasal mucosa of nearly every horse in apparent good health harbours non-pathogenic streptococci.

Following upon the research work of such savants as Pasteur, Metchnikoff, Ehrlich, and in this country Sir Almroth Wright and his followers, much valuable knowledge has been obtained upon the great principles of immunity, and it is to these principles vaccine therapy owes its foundation. That this foundation is scientifically sound no one will deny, and that the great curative value of suitable vaccines is only realized by those who use them and note the results. There is still much to be learned about vaccine therapy, and now is the time for the practitioner to seriously take up the subject so that he may keep in touch with the advancement being made all along the line. Better it is to ride on the crest of the wave of progress, though it may be rough, than to remain content in the dull waters of stagnation.

The day of the black draught and the red drench is slowly but surely passing away, and the dawn of a new era of scientific curative medicine is upon us. Let us hope the empiricism and commercialism of the older drug therapy will not extend to the newer vaccine therapy, although it must be confessed signs even at this early stage are not wanting of such an invasion extending into the realms of the latter. Now, the opportunity offers itself before irreparable damage is done for the State to step in and legislate with a firm hand.

Equine Clinicals.

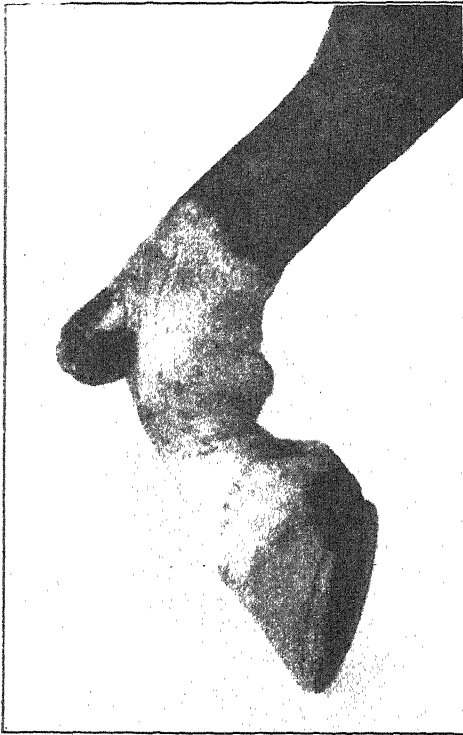
A UNIQUE ACCIDENT TO A HORSE.

By EDMUND BURKE, D.V.M., F.L.S., F.Z.S.

Professor of Surgery, Punjab Veterinary College, Lahore, India.

THE accompanying photograph shows pretty clearly the nature of the accident, which is, I think, unique.

The subject, a six-year-old mare, was brought to the College hospital for treatment on February 15 last year, shortly after the accident occurred. As the injury was considered incurable the owner was advised to have the animal destroyed, which was accordingly done.



Photograph taken after the accident.

The owner stated that while he was out for a ride the mare got frightened at a passing motor-car and suddenly swerved round. In so doing she severely knuckled over at the near hind fetlock, which instantly caused the joint to burst open in front.

When brought to the hospital the mare walked on three legs, carrying the injured limb flexed up, with the digit dangling loosely

below, and the inferior extremity of the large metatarsal bone protruding through a wound in front of the fetlock. An examination of the injury showed that the skin and subcutaneous fascia had been burst open to the extent of $3\frac{1}{2}$ in., and the extensor pedis tendon was completely ruptured, while the anterior common and both lateral ligaments of the fetlock were stripped off the distal extremity of the large metatarsal bone.

That the injury was caused by a sudden and severe knuckling at the fetlock, as stated by the owner, was most probably the case, from the fact that the edges of the wound had an uneven and torn appearance, as also the divided ends of the extensor pedis tendon, and the ligaments were stripped clean off the metatarsal bone. The surface of the skin, at the site of the injury, showed no abrasion or other sign of having been knocked against any hard object.

TREATMENT OF FISTULA OF THE SPERMATIC CORD.

By JOHN HAMMERSCHMID, V.S.

Lemberg.

I HAVE treated a second case of fistula of the spermatic cord successfully by adopting the following procedure: Widen the fistulous canal, and free the spermatic cord as far as possible.

Then, with an ordinary wound syringe, Lugol's solution 1:5:100 is injected every other day through the fistulous opening into the scrotum, and massaged up and down with the hand. In order to keep the passage open the fistulous canal is repeatedly widened.

Besides this treatment, and in order to soften the spermatic cord, the scrotum is bathed twice daily for half an hour at a time with very warm 2 per cent. lysol solution. It is bathed in this way until cure results.—*Oesterreichische Woch. für Tierheilkunde.*

Reviews.

Annual Report on the Civil Veterinary Department, United Provinces, for the Year ending March 31, 1913. Printed by F. Luther, Superintendent, Goonit Press, United Provinces, Allahabad. Price 9d.

In this Report the Hon. H. R. C. Hailey, I.C.S., mentions the difficulties as regards recruitment for veterinary service owing to candidates having an objection to going to other provinces where the colleges are situated. Cattle breeding is being rapidly developed and the number of hospitals and dispensaries maintained by the district boards has increased considerably. A new laboratory for

research work is being erected at Lucknow and will meet a great need. Messrs. E. W. Oliver, M.R.C.V.S., and C. W. Wilson, M.R.C.V.S., made tours of supervision and inspection throughout the provinces. As showing the wide area to be controlled, the former travelled 555 miles by road and 18,268 miles by rail, and the latter, 6,678 miles by rail, and 350 by road. Training in inoculation is being provided at the veterinary colleges. A scientific association, called "The United Provinces Veterinary Medical Society," has been formed, and it issues a periodical in the vernacular, a pamphlet on "Surra" has been published and circulated, and Mr. Oliver has given a series of lectures on meat inspection to recently appointed health officers.

During the year 75,571 cases of contagious disease have been notified with a reported mortality of 24,602. Rinderpest has been far and away the most prevalent and deadly. Thirty-eight animals affected with glanders were brought to the notice of the Civil Veterinary Department; surra cases were very few, and only five cases of dourine were brought to light. Foot-and-mouth disease was widely distributed, and a remark is made that "a special commission on foot-and-mouth disease from England has been deputed to India to study the disease *in situ*." Tuberculosis among bovines has been investigated at Cawnpore, at the instigation of Mr. Oliver, and as a first step in the campaign against human tuberculosis. Stud bulls are maintained in thirty-six districts, and at the beginning of the year there were fifty-six stallions on the Government register. Mr. Wilson attended many of the fairs and shows and judged the exhibits.

There are sixteen veterinary inspectors and 162 subordinate officers on the veterinary staff. These men are insufficient to cope with the work, but continued progress has undoubtedly been made and the services of another Imperial officer will soon be necessary. Mr. Wilson's Report shows evidence throughout of strenuous activity in veterinary matters, and there is no doubt that splendid work is being done which could be made more effective if recruits came in plentifully and were efficiently organized.

The Hon. A. W. Pim, Secretary to the Government, in his short note at the end of the Report, writes: "The probable expansion of the Department gives increased importance to the need for removing the present difficulties in recruitment, and the question of establishing a veterinary college for this province, on which the expense of training in Lahore or Calcutta will be avoided, is now under the consideration of the Government." G. M.

The Bloodstock Breeders' Review. Printed and edited by The British Bloodstock Agency, Ltd., 26, Charing Cross Road, London, W.C. Price 2s.

This quarterly, devoted to the British thoroughbred, contains articles on "The Heredity of Blood-vessel Breaking in the Thoroughbred," "Three-Year-Olds—the best of their Years," "The Story of Barcaldine," a horse who was never beaten, "Racing in Australia," and various statistics, pedigrees, and stallion announcements. Mr. J. B. Robertson tries to show that blood-vessel breaking

in the thoroughbred is of a hereditary nature. His facts go far to prove his theory and seem more lucid than some of his conclusions, e.g. "weakness of the vessel-wall is a segregable unit character in the germ plasm, having for its alternative the normal condition."

This quarterly magazine, which is illustrated, is well got up and printed, and is of undoubted value to those interested in the British thoroughbred, whether as breeders, trainers, owners, sellers, or buyers. This number contains a portrait of Mr. Alfred Stedall, and a short account of the life of a man who rose from a dealer in ladies' mantles to a racehorse owner and liberal patron of the turf. G. M.

The Chemistry of Cattle Feeding and Dairying. By J. Alan Murray, B.Sc.Edin., Lecturer in Agricultural Chemistry at the University of Reading. Pp. xii + 343, 27 illustrations. Price 6s. net. Publishers: Longmans, Green & Co., 39, Paternoster Row, London.

This book has been written mainly for the use of students pursuing college courses in agriculture, and it is hoped it may be useful also to practical farmers who have some previous knowledge of chemistry. It is divided into four main parts, dealing with the constituents of plants and animals, the requirements of animals, feeding stuffs, and dairying.

The chemistry of plants is fully discussed in the first ninety-seven pages, and as an exposition of the analysis and composition of plants it leaves little to be desired; but we think it would have been more practical and interesting if the action of some of the digestive juices on the constituents of the plants had been described and referred to in this section. In reference to the French name for protein we see no mention of *azole*, a term frequently used in French literature. Part II describes the various processes of digestion, but in order to know how various foods are acted on in the digestive canal one has to be constantly referring back to Part I to ascertain their chemical composition. Chapter x, on dynamics, seems to be of more value to horsekeepers than cattle feeders and dairymen. The pages on milk production are good, and show that the quantity of the milk may be influenced far more than the quality by any system of feeding, and the larger the yield of milk the greater the amount of additional food required. The production of hard and soft butter is influenced to a great extent by the character of the food, in the former case foods rich in protein and carbohydrates being needed, and in the latter food rich in fats. Peas, beans, clovers, vetches, maize, &c., are suitable to produce hard butter, whilst pasture grass, wheat bran, linseed cake, rape cake, &c., favour soft butter production. The valuation of feeding stuffs and compounding of rations have chapters to themselves, and from them the practical feeder may learn whether his rations are economical and on right lines. The graphic solution of problems in feeding by the aid of a chart is an innovation in methods of feeding instruction, and the author claims for it the merit of simplicity.

The chapter on concentrated foods is one of the best we have read in the English language, but when one comes to want to know, say, the difference between thirds and fourths, or what "randan" is,

and the identity of some of the foods with strange names which figure in the present day bill of fare for cattle, one does not gain any too much information on the point. If farmers always called things by their dictionary names they could doubtless be easily traced in the pages of this book. We think it would have been better if the by-products of flour and oil mills had been included in the industrial by-products, and the composition of these by-products more fully given.

The section on dairying is, in our opinion, the best in the book, although the addition of a chapter on the falsification and adulteration of milk and its products might have followed very usefully. English literature is almost silent on this subject, and the detection of such faults is almost solely work for the chemist. The book concludes with quite an adequate index. We only hope the volume may accomplish the object of producing a more scientific race of cattle feeders, but much educational groundwork of the right kind has yet to be done in country districts before the first principles of this book can be assimilated. Notwithstanding the work of the agricultural colleges, we fear that the race of rule-of-thumb feeders will greatly preponderate for many years yet to come.

G. M.

TENTH INTERNATIONAL VETERINARY CONGRESS.

A MEETING of the Committee appointed to select reporters was held at 10, Red Lion Square, W.C., on Friday, January 9, 1914. Present: Sir John McFadyean in the chair, Messrs. Banham, Carter, Garnett, Professor Mettam, Mr. Price, Major-General F. Smith, Sir S. Stockman, Major A. G. Todd, Professor Wooldridge.

MINUTES.

The minutes of the previous meeting were read and confirmed.

REPORTERS.

The Honorary Secretary reported the result of correspondence with the reporters invited, most of whom had accepted. In the cases of refusal he had written to others on the list recommended by the National Committees, and the list was now as follows:—

GENERAL MEETINGS.

(1) *Official Opening.*

(2) *Foot-and-mouth Disease.*

Reporters [those marked * have not yet replied]: Herr Geheimer Regierungsrat Dr. Nevermann, Berlin; M. E. Leclainche, Inspecteur-Général, Chef des Services Sanitaires au Ministère de l'Agriculture, Paris; *Dr. Mohler, United States Department of Agriculture; M. le Docteur Remmelts, Chief Inspector of the Veterinary Service, The Hague; Herr Professor E. Hess, in der Fakultät der Veterinärmedizin, Universität,

Bern; Professor A. E. Mettam, Principal, Royal Veterinary College of Ireland; Dr. Josef Rudovsky, Landes Veterinäreferent, Brunn, Austria.

(3) *Tuberculosis.*

Herr Professor Dr. Eber, Direktor des Veterinar Instituts, Leipzig; M. le Professeur Vallée, Directeur de l'Ecole Vétérinaire, Alfort; Professor Sir John McFadyean, Principal, Royal Veterinary College, London; M. G. Regner, Veterinary Department, Ministry of Agriculture, Stockholm; M. le Professeur de Jong, University, Leiden.

(4) *Epizootic Abortion.*

Herr Regierungsrat Professor Dr. Zwick, Kaiserliche Gesundheitsamte, Berlin; M. le Professeur Moussu, l'Ecole Vétérinaire, Alfort; Herr Sanitätstierarzt Sven Wall, Öffentlicher Schlachthof, Stockholm; Sir Stewart Stockman, Chief Veterinary Officer, Board of Agriculture, London.

(5) *Public Control of the Distribution and Sale of Milk in the Interests of Public Health.*

Dr. A. D. Melvin, Chief of the Bureau of Animal Industry, Washington; Herr Geheimer Regierungsrat Professor Dr. von Ostertag, Direktor der Veterinarabteilung des Kaiserlichen Gesundheitsamte, Berlin; M. S. P. Nystedt, Erste Stadtierarzt, Stockholm; Mr. J. W. Brittlebank, D.V.S.M., M.R.C.V.S., Public Health Department, Manchester.

(6) *Closing Meeting.*

SECTION I.

Veterinary Science in Relation to Public Health.

(1) *Meat Poisoning: Its Pathogenesis and the Measures necessary to guard against it.*—Herr Professor Bongert, Tierärztliche Hochschule, Berlin; Schlachthofdirektor Dr. Hans Messner, Carlsbad; *Dr. Guillaume, Directeur de l'Abattoir de la Ville de Nice.

(2) *General Principles to be observed in the Inspection of Carcasses and Organs of Tuberculous Animals with a view to determine their safety as Articles of Human Food.*—M. le Dr. Stubbe, Inspecteur Vétérinaire Général au Ministère de l'Intérieur, Brussels; M. Cesari, Vétérinaire Sanitaire de la Seine, Paris; Herr Obertierarzt Dr. Nieberle, Hamburg; *Herr Sanitäts-veterinar Hy. Hansson, Stockholm.

(3) *Disinfection of Wagons.*—M. le Professeur Dr. E. Bidart, à la Faculté de Médecine Vétérinaire, Université, Buenos Aires; Herr Regierungsrat Dr. Titze, Kaiserliche Gesundheitsamte, Berlin; M. Rabieaux, Inspecteur-Général des Services Sanitaires aux Ministère de l'Agriculture, Paris; *Professor Meloni, Naples.

SECTION II.

Pathology and Bacteriology.

(1) *Johnes's Disease*.—M. le Dr. Olaf Bang, Copenhagen; Herr Professor Dr. Miessner, Tierärztliche Hochschule, Hannover; Mr. A. L. Sheather, B.Sc., M.R.C.V.S., Royal Veterinary College, London.

(2) *Bovine Piroplasmoses (European)*.—Herr Professor Dr. Knuth, Abteilungvarstcher im Hygienischen Institut, Tierärztliche Hochschule, Berlin; M. le Professeur S. von Ratz, l'Ecole Vétérinaire Supérieure, Budapest; Mr. W. G. Wragg, M.R.C.V.S., Laboratory of the Board of Agriculture, London.

(3) *Ultra-visible Viruses*.—Dr. K. F. Meyer, University of California, U.S.A.; M. le Professeur Panisset, l'Ecole Vétérinaire, Lyons; *Herr Dozent Dr. Pfeiler, Leiter der Abteilung für Tierhygiene am Kaiser Wilhelm Institut, Bromberg.

(4) *Distemper—Etiology and Vaccination*.—Herr Professor Dr. S. Sigismund Markowski, Tierärztliche Hochschule, Lemberg; M. Carré, Chef de Laboratoire au Laboratoire des Recherches du Ministère de l'Agriculture, l'Ecole Vétérinaire, Alfort.

SECTION III.

Epizootology.

(1) *Anthrax*.—Dr. W. H. Dalrymple, Louisiana State University, U.S.A.; Herr Dr. Aladar Lukacs, Laboratorium für Schutzimpfstoffe, Budapest; Herr Rektor und Professor Dr. J. Szpilman, Tierärztliche Hochschule, Lemberg; Major Holmes, Imperial Bacteriologist, Muktesar, India.

(2) *Swine Fever*.—Dr. Marion Dorset, U.S.A. Department of Agriculture, Washington; Herr Hofrat Rektor und Professor Dr. Hutyra, Tierärztliche Hochschule, Budapest; *Herr Bezerks-tierarzt Dr. R. Frauenberger, Freistadt, Austria; *Herr Dr. Glässer, Repetitor an der Tierärztliche Hochschule, Hanover.

(3) *Glanders*.—M. M. de Roo, Inspecteur Vétérinaire Principal au Ministère de l'Agriculture, Brussels; M. Drouin, Vétérinaire Directeur de la Cavalerie de la Cie. Générale des Voitures de Paris; Herr Professor Dr. J. Schnürer, Tierärztliche Hochschule, Vienna; Mr. J. R. Jackson, M.R.C.V.S., Board of Agriculture, London; Herr Professor Dr. Peter, Landestierarzt, Hanover.

(4) *Sarcoptic Mange of the Horse*.—M. le Vétérinaire Principal A. Barrier, Paris; Colonel Butler, War Office, London; Herr Landesveterinareferent Theophil Halski, Czernowitz, Austria.

SECTION IV.

Veterinary Medicine and Surgery.

(1) *Anæsthesia*.—M. le Professeur Hendricks, l'Ecole Vétérinaire, Brussels; Dr. L. A. Merrillat, Chicago, U.S.A.; Herr Professor Vennerholm, Tierärztliche Hochschule, Stockholm; Professor G. H. Wooldridge, Royal Veterinary College, London.

(2) *Laminitis*.—M. le Professeur Liénaux, l'Ecole Vétérinaire, Brussels; M. le Vétérinaire Principal Joly, du 9me Corps d'Armée, Tours; Professor James Macqueen, Royal Veterinary College, London.

(3) *Surgical Treatment of Roaring*.—Herr Professor Dr. Eberlein, Tierärztliche Hochschule, Berlin; Dr. W. L. Williams, Cornell University, U.S.A.; M. le Professeur Dr. Fontaine, l'Ecole de Cavalerie, Saumur; Mr. F. T. G. Hobday, F.R.S.E., F.R.C.V.S., London.

(4) *The Use of Drugs in the Treatment of Disease caused by Nematode Worms*.—M. le Professeur Van der Eckhout, l'Ecole Vétérinaire, Brussels; M. le Professeur Railliet, l'Ecole Vétérinaire, Alfort; Professor J. F. Craig, M.A., M.R.C.V.S., Royal Veterinary College of Ireland, Dublin; M. le Professeur Peroncito, R. Università di Torino Istituto di Parassitologie, Turin.

SECTION V.

Tropical Diseases.

(1) *Diseases transmitted by Ticks; their Classification, Treatment, and Prevention*.—*Dr. D. E. Salmon, Washington, U.S.A.; M. le Professeur J. Lignières, Faculté de Médecine Vétérinaire de l'Université, Directeur de l'Institut National de Bactériologie, Ministère de l'Agriculture, Buenos Aires; Sir A. Theiler, K.C.M.G., Director of Veterinary Research, Transvaal; Mr. C. E. Gray, M.R.C.V.S., Principal Veterinary Surgeon, Transvaal; *Dr. Paulo Parreiras Horta, Directoria do Service de Veterinaria, Rio de Janeiro.

(4) *Diseases transmitted by Winged Insects; their Classification, Treatment, and Prevention*.—M. Cazalbou, Vétérinaire en première au 70me d'Artillerie, Rennes; Mr. R. E. Montgomery, M.R.C.V.S., Veterinary Bacteriologist, Department of Agriculture, Nairobi, British East Africa; *Dr. L. O. Howard, Bureau of Entomology, Department of Agriculture, Washington, U.S.A.; *Dr. Pinto Guedes, Rio de Janeiro; *Dr. Christino Cruz Filho, Rio de Janeiro; Professor A. Lanfranchi, Directeur Institut de Pathologie Veterinaire, Parma, Italy.

LANTERN.

It was resolved that arrangements should be made for the provision of a magic lantern for the purpose of illustrating the papers where necessary.

The Honorary Secretary reported that he had received applications from certain gentlemen for permission to read papers unofficially on subjects other than those in the programme, and on the motion of Mr. Lawson, seconded by Mr. Barrett, it was unanimously decided that no additions be made to the programme as already arranged.

DELEGATES.

The Honorary Secretary submitted the following list of countries which had so far promised to send delegates to the

Congress: The Commonwealth of Australia, Bulgaria, Barbados, Belgium, Canada, China, Denmark, Holland, India, Luxemburg, Leeward Islands, New Zealand, South Africa, Western Australia.

ROYAL COLLEGE OF VETERINARY SURGEONS.

FELLOWSHIP DEGREE.

A meeting of the Board of Examiners for the Fellowship Degree was held at the College, 10, Red Lion Square, W.C., on Saturday, January 31, 1914. The following is a list of the successful candidates, together with the titles of their respective Theses:—

Richard Finch, "Milk; its Diseases and Contaminations."

S. J. Motton, "The Surgical Sequelæ of Parturition in the Mare and Cow."

W. T. Brookes, "The Ante-mortem and Post-mortem Diagnosis of Bovine Tuberculosis."

Capt. G. B. C. Rees-Mogg, "Ovariectomy of the Domesticated Animals."

Charles Hartley, Jun., "Bier's Hyperæmia in Veterinary Practice."

The Examiners were Prof. J. Macqueen, Messrs. J. Malcolm and W. Woods; Mr. W. J. Mulvey in the chair.

FRED BULLOCK, *Secretary*.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editors.

Manuscript—preferably type-written—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox

THE VETERINARY JOURNAL

APRIL, 1914.

Editorial.

OUR COLLEAGUES IN THE AMERICAN ARMY.

For a long time the position of our colleagues in the American Army has left much to be desired; in fact, they may almost truly be said to have had no military status at all, and the state of affairs was well-nigh intolerable to them as educated men belonging to one of the professions. Backed up by the American Veterinary Medical Association a number of civilian practitioners, foremost amongst whom have been Drs. Horace Hoskins, John Mohler and Adolph Eichhorn, have for a long time been hammering away at the Government authorities to get this state of affairs altered and a proper Army Veterinary Service established on similar lines to those in all other civilized countries. The great importance of military rank to those who serve in the Army, whether officers of a special department or combatants, cannot be too much insisted upon, and the difference in status between the position of affairs where this is present and where this is absent is too palpable even for discussion.

It is astonishing that a great and civilized country like the United States has for so long persistently refused to grant what even the turbulent Balkan States consider a necessity, and that in their military organization there is no recognition of the veterinary profession as a profession. At the present time the veterinarian is a kind of nondescript, neither an officer nor a man, in fact, merely a "tweeny," and in such a derogatory place that

it is not a position for which there is much competition nor for which the best men will apply.

If only all the qualified veterinarians would but hang together and all firmly boycott the Service it would not take many months for their object to be gained, for horses and mules must have doctors who understand their ailments and meat must be properly inspected. Chaos is bound to ensue when one integral part of the whole becomes disaffected and stands firm to its point, and that the veterinarian is essential has been proved over and over again in all armies and all wars.

The Army Veterinary Service Bill at present before the United States Congress has passed the House Military Committee on a unanimous vote, and it now only awaits confirmation when brought before the House.

That it may not pass is possible even yet, and the final vote is awaited by every American veterinarian with the greatest anxiety.

We, their British colleagues, can assure them, from our side of the water, that they have for a long time had our earnest sympathy, and that we wish them the greatest possible success.

Original Communication.

A FIFTH SEASON'S REPORT UPON THE PERMANENT VALUE OF THE VENTRICLE STRIPPING OPERA- TION FOR "ROARING."

By FREDERICK HOBDAV, F.R.C.V.S., F.R.S.E.

*Honorary Veterinary Surgeon to His Majesty the King, and formerly Professor in
the Royal Veterinary College, London.*

Kensington, W.

IN fulfilment of a promise made to the readers of THE VETERINARY JOURNAL some years ago, I am presenting another year's report upon the value of the ventricle stripping operation, first brought into prominence as a practical measure by Dr. Williams,* of Cornell University, for "roaring" in horses.

There is no question but that the operation can be said to have attained success in a very large number of cases, a further year's experience being that the proportion stated in THE VETERINARY JOURNAL last year† (fully 75 per cent. of hunters and 90 to 95 per cent. of carriage horses) of useless horses made useful, is by no means exaggerated.

Similar favourable reports have now been published or received from various parts of the world, notably in America by Merrilat, Cary, Blattenberg, and others; in Italy by Professor Antonini‡; in Germany by Professor Eberlein§; in France by Professor Cadiot|| and M. Victor Drouin¶; in Hungary and Austria by Mr. W. Reynolds, M.R.C.V.S.,‡ and the operation may truly be said to have become a godsend in its value to both owner and patient, in preference to the only other previously known method of relief, viz., the tracheotomy tube.

Even if the operation only gave relief for one season, and the tube had then to be inserted it would be worth doing, for every owner or stud groom who has had experience of the cleansing and general care required by a "tubed" hunter will without hesitation assert that if the evil day *can* be staved off for even only so short a period as one year it is worth while making the attempt; and one very strong point in favour of this operation is, that even if it does not succeed the horse is just as good as he was before for the insertion of the tube.

There have been, in my experience, so far as I have been able to trace up to the present, less than 2 per cent. of relapses, and most of these did one or two season's hunting before it occurred. I write now from the results of 837 individual horses whose respective histories since the operations I have kept in touch with.

The first two horses operated upon in England, which were

* *Proceedings of the American Veterinary Medical Association*, 1906, 1907, 1911.

† THE VETERINARY JOURNAL, April, 1913, "The Fourth Season's Report upon the Permanent Value of the Ventricle Stripping Operation for 'Roaring.'"

‡ "Il Cornegio e la nuova Operazione" (Congresso Nazionale Veterinario, Turino, 14-16 Settembre, 1911).

§ THE VETERINARY JOURNAL, September, 1912 (a translation).

|| *Recueil de Médecine Vétérinaire*.

¶ Communicated.

done by Dr. Williams in September, 1909, are still at work to the satisfaction of their respective owners.

The list given on pp. 168 to 171 is a continuation of the history for another year of 100 cases, the same which were reported upon in *THE VETERINARY JOURNAL* for January, 1911.

During the past year, on numerous occasions at Tattersall's, Warner Sheppard and Wade (Leicester), and other places, horses which have been operated upon have been entered in the catalogues as "operated upon for wind," and described as "practically cured," thus showing that the vendors are not afraid to admit the fact, and the prices reached have been quite on a *par* with those of average hunters.

I know of no reason at present for altering any opinion expressed in the reports of previous years, and the following brief extracts from letters of owners whose horses are in the above list are still further confirmatory evidence of the permanent value of the results obtained:—

Case 8.—February 24, 1914. "The bay horse 'Newsboy' is dead. He broke his leg in the hunting field, going well to the last, although making a noise.

"The grey horse seems to be quite cured, gallops on and does not tire, and makes no perceptible noise; would probably pass a vet."

Case 18.—Owner wrote, February 26, 1914: "The chestnut horse is going much better this season than he did last season. He is in much better condition. He was out hunting to-day with the Enfield Chase Stagounds, and I took particular notice of him; and I must say he went remarkably well. He was well up to the front all the time, which was an hour and fifteen minutes. He has hunted twice this week, and he is hunting again on Saturday.

"The only thing I can see against the horse is that he has a little discharge from the nose, but not so bad as it was last winter. He is a *real good hunter*."

Case 25.—At first the result was so excellent that, although the horse was a bad roarer prior to operation, both the owner and a well-known hunting veterinary surgeon considered the beast to be "sound in wind," and a certificate was given to that effect. Some months later, however, after galloping about one and a half miles a curious habit of gulping would come on, and if not allowed to slacken speed the animal was threatened with dyspnoea. This would pass off in a few minutes when pulled up, and only reappear after a hard gallop.

As only one side had been done, it was decided to reopen the larynx and strip the right ventricle. This was done on November 23, 1911, and a V-shaped portion of the soft palate excised, as this appeared abnormally relaxed and enlarged. The result was to temporarily benefit the horse, and the animal went back to hunting for some months.

The gulping, however, returned, and after the hunting season the horse was shot (July, 1913).

Case 29.—February 23, 1914: "The gelding 'Challenger' is still hunting and going very well. My son has him at Cambridge."

Case 55.—February 25, 1914: "The 'tubed' horse that you did in 1910 goes splendidly. He makes a slight noise, but it does not stop him at all."

Case 70.—February, 1914: "The owner is pleased to say that the mare operated on four years ago has got no worse since she was done. She still makes a noise when galloping, but it does not seem to distress her."

Case 79.—March 28, 1914. Owner wrote: "The chestnut horse operated on for his wind in May, 1910, makes very little noise except when he is very fresh, or pulls hard in very heavy land. It is a certainty that if the operation had not been performed on him I should never have gone on riding him, as I hate a noisy horse."

Case 81.—March 27, 1914. Owner wrote: "I am pleased to state that my horse you operated upon in May, 1910, is still going well.

"I am not certain that he would pass the vet., but he gallops strong and well and does not roar; he makes a little noise, but it is not perceptible casually, and does not stop him; before he roared at a trot."

Case 89.—February 23, 1914: "I am still of opinion that the operation for roaring is a very great success.

"The brown horse you first of all only did on one side, and the year after completed the other side, is really wonderful. Just when first starting off you can hear him slightly, but afterwards not at all."

Case 97.—March 28, 1914. Owner wrote: "I have much pleasure in informing you that my roan horse which you operated on (I think four years ago) has been going thoroughly strong and sound. He has again carried my huntsman all this season and has put in an exceptionally hard time, doing very often other horses' work, and has not been sick or sorry once. A most remarkable success."

Case 108.—March 27, 1914. Owner wrote: "The operation you performed on my bay hunter in 1910 has been most successful. I do not say there is no noise, for I think in that respect the horse is going back; but he is going as strong as ever this season, and his wind does not seem to distress him."

Case 115.—March 27, 1914: "The grey hunter operated on in June, 1910, is going wonderfully well, and 'hops the top twig' twice a week. He makes a little noise, but it does not stop him at all, and is nothing to what it was before operation."—M.R.C.V.S.

Case 116.—March 29, 1914. Owner wrote: "I am glad to be able to tell you that the chestnut hunter you operated on for roaring in June, 1910, is still going on satisfactorily."

Case 117.—February 25, 1914: "The horse of mine on which you operated some four years ago has been hunting all this year; was, in fact, out on Monday last. He makes a noise, and it stops him occasionally, but for Sussex he is as useful a horse as one wants, as the wind affection does not interfere with him in a hunt in that country, though I sometimes notice it on the Downs."

Cases 119 and 120.—On March 27 the veterinary surgeon wrote:

No. of case	Date of operation	Class of horse	Age	Description before operation	Result on first trial	Report in January, 1911	Report in April, 1912	Report in April, 1913	Present report (March, 1914)
1	1909 Sept. 10	Hunter	10	Bad whistler	Excellent	Excellent	Excellent	Excellent	Excellent.
2	" " 1910 Jan. 25	"	9 or 10	"	"	"	"	"	"
5	"	"	7	Bad roarer	Much improved	Can gallop freely without distress	Satisfactory	Satisfactory	Unable to trace.
8	Feb. 3	"	10	"	"	Can gallop without distress, although makes noise	Satisfactory	Excellent	Excellent till destroyed for broken leg.
10	Feb. 15	"	6	Bad roarer	Excellent	Second operation, Aug. 30	Excellent	Sold and lost trace of.	Sold and lost trace of.
11	"	"	8	Bad whistler	"	Excellent... cured, perhaps a little thick in wind	"	Excellent	"
18	April 1	"	7	Roarer	Not very satisfactory	Satisfactory	See notes	Hunting well, but at 11 has nasal discharge	Much better than last year.
20	April 6	"	"	"	Good...	"	Satisfactory	Satisfactory	Satisfactory.
22	"	"	"	"	Excellent	Excellent	Excellent	Excellent	Developed heart trouble.
25	April 10	"	6	Bad roarer	"	"	Satisfactory	Satisfactory	Destroyed.
29	"	"	8	Roarer	Not good	Second operation, Sept. 29. Now satisfactory	"	"	Dead. See note.
31	April 15	Racer	3	Bad roarer	Slight whistler, but no distress	Slight whistler, but no distress	Satisfactory	Sold; unable to trace	Satisfactory.
40	"	Hunter	5	Bad whistler	Excellent	Excellent	Excellent	Excellent	Dead.
41	April 19	"	8	Confirmed roarer	"	"	Excellent	Makes a noise again, but can hunt without distress.	Destroyed for lameness.
44	April 23	"	9	Bad roarer	"	"	Excellent	Excellent	Unable to trace.
45	April 24	"	5	Bad whistler	"	"	Excellent	Satisfactory	Excellent.
51	April 24	"	7	"	"	"	Excellent	Sold and lost sight of	Satisfactory until shot after an accident.
53	April 27	"	7	"	"	"	"	Excellent	lost sight of.

55	April 27	Hunter	...	9	Bad roarer	...	Satisfactory	...	Satisfactory	...	Excellent	...	Excellent.
57	"	"	...	7	Bad whistler	...	Excellent	...	Excellent	...	Relapsed and was shot	...	...
58	April 30	"	...	7	Bad roarer	...	Improved	...	Satisfactory	...	Sold and lost sight of...	...	Unable to trace
64	May 4	"	...	...	Moderate whistler	...	Excellent	...	Excellent	...	Sold for £200 and lost sight of	...	Unable to trace further.
68	May 7	Van gelding	...	7	Bad roarer	...	"	...	Satisfactory	...	Still satisfactory	...	Satisfactory.
70	May 8	Hunter	...	6	"	...	"	...	Excellent	...	Excellent	...	Excellent.
71	"	"	...	6	"	...	Temporarily better...	...	Second operation, Sept. 9. Excellent	...	"	...	"
73	May 10	"	...	16	"	...	Excellent	...	"	...	"	...	Excellent.
79	May 22	"	...	12	"	...	Not very satisfactory	...	Still some noise, but hunting without distress	...	Satisfactory. See notes	...	Satisfactory.
81	May 23	"	...	...	"	...	Excellent	...	Excellent	...	Excellent	...	Excellent.
85	May 28	Harness horse	...	9	"	...	Improved	...	Second operation, August 3. Now excellent	...	Satisfactory	...	Satisfactory.
87	May 30	Hunter	...	6	"	...	Excellent	...	Excellent	...	Excellent	...	Sold and lost sight of.
89	June 1	"	...	9	Roarer	...	"	...	Now satisfactory	...	"	...	Excellent.
92	June 5	"	...	9 or 10	Bad whistler	...	Not very satisfactory	...	"	...	Slight relapse, but still hunting	...	Has been shot.
93	"	"	...	7	Roarer	...	Satisfactory	...	Satisfactory	...	Slight relapse	...	Sold and lost sight of.
96	June 9	"	...	15	Bad roarer	...	"	...	"	...	Excellent	...	Excellent.
97	June 10	"	...	9	"	...	Not satisfactory	...	Excellent	...	"	...	Unable to trace further.
98	June 11	"	...	8	"	...	Satisfactory	...	Satisfactory	...	Sold and lost sight of...	...	Excellent.
100	June 12	Russian Orloff trotter	...	4	"	...	Excellent	...	Excellent	...	Excellent	...	Excellent.
101	"	Russian trotter	...	4	"	...	"	...	"	...	Has developed very severe strangles	...	Unable to trace further.
105	June 15	Hunter	...	6	"	...	No improvement	...	Second operation. Improving	...	Relapsed	...	Sold and lost sight of.
106	"	"	...	12	"	...	Improved, but still makes noise	...	Second operation, Sept. 10. Now satisfactory	...	Satisfactory. See notes	...	Destroyed for injury.
107	June 16	"	...	7	"	...	Satisfactory	...	Satisfactory	...	Satisfactory	...	Developed ring-bone and sold.
108	"	"	...	7	Roarer	...	Excellent	...	Excellent	...	Excellent	...	Excellent.

[illegible]

160	Aug. 5	Hunter	6	Slight whistler	Excellent	Improving	Excellent ...	...	Excellent ...	Was sold and lost sight of	...	Satisfactory.
161	Aug. 6	"	9	Roarer ...	Not good	Satisfactory	Satisfactory	...	Satisfactory	Satisfactory	...	Satisfactory.
162	"	"	7	Bad roarer	Satisfactory	...	...	...	"	"	...	Excellent. See notes.
163	"	"	6	"	Excellent	...	Excellent ...	...	Excellent ...	"	...	...
167	Aug. 9	Carriage	9	"	"	...	"	...	Satisfactory	"	...	Satisfactory.
170	Aug. 12	Hunter	5	"	"	...	"	...	Excellent ...	Excellent	...	Lost trace of. Now in Belgium.
171	"	"	5	Bad whistler	"	...	"	...	Satisfactory	Sold and lost sight of ...	...	Unable to trace further,
172	"	"	5	"	"	...	"	...	"	"	...	"
173	"	"	5	"	"	...	"	...	"	"	...	"
174	Aug. 19	Harness	10	Roarer ...	Satisfactory	...	Satisfactory	...	"	Satisfactory	...	Excellent.
176	Aug. 20	Hunter	6	"	Excellent	...	Excellent ...	...	"	"	...	Satisfactory.
178	"	"	Aged	Whistler	Satisfactory	...	Satisfactory	...	"	"	...	"
181	Aug. 21	"	5	Roarer ...	Excellent	...	Excellent ...	...	Excellent ...	Sold and lost sight of ...	...	lost
182	Aug. 22	"	6	"	"	...	"	...	"	Excellent	...	Sight of.
183	"	Shire	3	Bad roarer	"	...	"	...	"	"	...	Excellent.
185	Aug. 26	Hunter	9	"	Satisfactory	...	"	...	"	Satisfactory.	...	Satisfactory.
186	"	"	4	"	"	...	"	...	"	Sold and lost sight of ...	...	...
190	Sept. 8	"	4½	Whistler	"	...	Excellent ...	...	Excellent ...	Satisfactory	...	Satisfactory.
191	Sept. 13	"	5	Bad roarer	"	...	Satisfactory	...	Satisfactory	See notes	...	Excellent.
192	Sept. 14	Trooper	11	"	"	...	"	...	"	"	...	Satisfactory.
193	"	"	7	"	"	...	"	...	"	"	...	Sold and lost
194	"	"	6	"	Excellent	...	Excellent ...	...	"	"	...	sight of.
195	Sept. 17	Carriage	5	"	"	...	"	...	"	"	...	Satisfactory.
196	"	Hunter	12	Roarer ...	Satisfactory	...	Satisfactory	...	"	Relapsed and been tubed	...	Hunting with tube.
197	Sept. 18	"	8	"	"	...	"	...	"	Satisfactory.	...	Satisfactory.
198	"	"	5	Bad roarer	"	...	"	...	"	See notes	...	Sold. Unable to trace.
199	Sept. 20	"	12	"	"	...	"	...	"	"	...	Satisfactory.
203	Oct. 1	"	8	"	Bad ...	...	Excellent ...	...	Excellent ...	See notes	...	Sold and lost
204	Oct. 4	"	9	Roarer ...	Satisfactory	...	Satisfactory	...	Satisfactory	"	...	sight of.
205	"	Pony	Aged	Bad Roarer	Excellent	...	Excellent ...	...	Satisfactory	Satisfactory until	...	destroyed.
206	Oct. 7	Hunter	7	Bad whistler	"	...	Excellent ...	...	Excellent ...	Now dead	...	Excellent.
208	"	"	5	Whistler	"	...	"	...	"	"	...	Satisfactory.
216	"	Harness	8	"	"	...	"	...	"	Satisfactory	...	Excellent.

"I have spoken to Colonel K——, and he says 'Puggy' is still going well, and that the operation is a great success.

"Lord L——'s horse was sold at Leicester last autumn, and I have lost sight of him, but he was quite all right then."

Case 129.—February 23, 1914: "The mare 'Cinderella' is still carrying me as well as ever, never 'sick or sorry,' and I may fairly repeat and confirm contents of my letter of March 24, 1913."

Cases 137 and 138.—On March 16 the veterinary surgeon wrote: "Colonel M——'s hunter has been sold, and was almost cured. The operation was a success. Captain C——'s horse has been hunting and doing military work ever since, and is practically all right."

Case 141.—March 27, 1914: "The chestnut hackney gelding which you operated upon for roaring in July, 1910, was still going on satisfactorily up to last May, when it was sold by auction with the other horses."—M.R.C.V.S.

Case 151.—February 22, 1914: "'John Peel' is a great success, and makes no noise at all after three hard seasons."

Case 155.—March 14, 1914: "'Scarlet Runner' is going 'tip-top' this season."

Cases 161, 162, 163.—On March 14 the veterinary surgeon with whom these cases were operated upon in consultation wrote: "Colonel L——'s horse is still carrying him 'the best,' and Miss A——'s horse, too, went splendidly this season, whilst Mr. R——'s horse won a Point-to-Point last week for its new owner."

Case 174.—March 27, 1914. The veterinary surgeon wrote: "Miss H——'s bay horse carried her to hounds well, and also did his harness work in the summer without any distress, although he always made a slight noise. As this horse went a roarer after a very acute attack of pneumonia, he was a distinct success, as previous to the operation he was worthless. Unfortunately he split a pastern and was destroyed."

Case 191.—March 7, 1914: "The grey hunter is going excellently; makes a blowing noise only. Worth £80 at least."

Case 197.—In a letter dated March 15, 1914, the owner wrote: "I have no change to report in my horse, 'Captain Kettle'; he fully maintains the great improvement made in him by your operation.

"I have hunted him all the season with the Mid-Kent Stag-hounds—a very big and heavy country—we have had some very fast runs, and he has not been distressed. Of course, he still makes a slight noise when galloping fast in heavy going, and I occasionally have to slow him down for a minute or two, but apart from this his wind seems quite good. This result is very satisfactory to me, as he is the best horse I have ever ridden, and I value him much. He was turned out to grass all last summer."

Case 204.—March 15, 1914: "This horse was a great success, and could gallop to the end of any hunt without any sign of distress. The animal is now dead, having got paralysis of hind quarters, for which it was destroyed."

Case 206.—March 16, 1914: "I sold the horse last year that you operated upon for me. The result of the operation appeared to be permanent. The horse was very much hindered by his wind before the operation, but afterwards it was able to hunt without inconvenience. He was hunting all last season and this."

Case 216.—March, 1914: "The roan mare is very satisfactory, and going better than ever she did. The result of the operation is still quite successful."

General Articles.

THE PUBLIC ABATTOIR AND DESCRIPTION OF THE NEW BUILDINGS AND PLANT OF BELFAST.*

DURING the nine years 1855 to 1864, while the famous Chancery suit of "*Rea v. the Belfast Corporation*" was proceeding, although Belfast was rapidly increasing in population, valuation and area, municipal enterprise was practically at a standstill; but the incubus of the litigation once removed the town rapidly made up the leeway of its paralysed progress, and amongst many other reforms of the next few years it was decided to build Belfast's first public slaughter-house.

Previously, animals were slaughtered for food in Belfast at such time and place, and under such circumstances, as the owner thought fit, without supervision or regulation of any kind—generally in the small yard of the butcher's shop—a condition of affairs often inseparable from cruelty, uncleanness and insanitary surroundings. That some of these places were of fair size, however, may be inferred from the fact that Benn, in his "*History of Belfast*," says, "in 1763, a small society of very poor people met in an old slaughter-house for worship."

As a matter of public convenience, perhaps, rather than of public health, but doubtless, also, with an eye to increased municipal revenue, the Corporation, on the advice of a deputation, built the present slaughter-house in M'Auley Street in 1869 on the Parisian model, at a cost of £33,203, Paris possessing at that time the finest abattoir in Europe.

In 1883 accommodation became so restricted that the slaughter-house was enlarged, at a cost of £3,000, and some years later "hanging rooms" and more modern equipment were provided.

As an indication of the enormous increase of business at the abattoir it may be stated that the number of animals of all kinds killed during the year 1912 was 81,783, as compared with 1,050

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killed in 1870, when the abattoir was first opened. For a long time it has been felt that alterations and additions to the present buildings had reached their limit, and that the march of sanitary science and growing demand for space and accommodation, consequent upon the rapid development of a great city, have made it imperative that an abattoir commensurate with the size and importance of Belfast should be erected without further delay.

For a period of seventeen years the movement to build a new abattoir ebbed and flowed with varying degrees of intensity, and with this movement the name of the present Chairman of the Markets Committee (Dr. Henry O'Neill, B.L.) has been indissolubly associated.

The Markets Committee, in loyal support of their Chairman, brought the movement to a definite and final issue in 1909, when they obtained the sanction of the Council to the erection of a new abattoir in accordance with plans prepared by the City Surveyor, which were based upon the report of a deputation of the Markets Committee appointed in the same year.

The site for the new abattoir in Stewart Street was selected because of its close proximity to the markets, cattle sale yards and railway, so that animals could be delivered direct without crossing the city. The total area of the site is 3 acres 3 roods and 8 perches, and the area covered by buildings and passages $3\frac{1}{4}$ acres, thus leaving a small portion available for further expansion, which, however, can be increased by the appropriation of part of the adjoining Market Yard.

Although the area covered by the new buildings is apparently small for the size of the city it must not be forgotten that it is considerably larger than the built-upon area of the old abattoir, which measures somewhat less than one acre, and that every effort has been made to use the ground to the best advantage, and to reduce the time of each operation to a minimum by the introduction of the most up-to-date equipment.

The abattoir has been arranged for the slaughter of cattle, sheep and pigs, and each of the three departments has been kept separate, that is to say, there is a separate lairage, slaughter hall and hanging hall for each kind of animal, the offal only being dealt with in common.

The abattoir has been planned so that the tripery, engine and boiler house, cattle, sheep and pig hanging rooms, and cold

storage abut directly upon the main thoroughfare, and separate passages for cattle have been provided which will prevent obstruction.



Mr. J. A. JORDAN, M.R.C.V.S., City Veterinarian.

The buildings, which have been designed in a simple style, are constructed of red brick with stone dressings, and are roofed with slate. All internal angles at junctions of walls with each other and with floors have been formed with hollow curved



Mr. J. A. JORDAN, M.R.C.V.S., City Veterinarian, and Meat Inspection Staff.

bricks, and where considered necessary the walls are faced with a glazed brick dado 6 ft. high.

The main road inside the abattoir for butchers' carts, &c., has been finished with lithomac on concrete, and the passages

for cattle, &c., where there will be no vehicular traffic, are of concrete with granolithic finish.

The administration block contains the Veterinary Surgeon's offices and laboratory, Meat Inspector's office, ticket office, and Manager's house; also a cloak room, baths, lavatories, and mess room for butchers, which are approached separately and have no direct connection with the administrative department.

The main entrance passage to the abattoir is flanked on the north side by the administration department, and on the south side by a railed-in passage for cattle.

The cattle entrance passage is provided with cross gates at intervals so that it can be formed into pens while the beasts are being counted and tickets issued.

The cattle lairage is 220 ft. long by 48 ft. wide, and provides accommodation for 250 beasts.

The lairage has been arranged with transverse passages, and the cattle divisions, which are at right-angles to same, abut upon feeding passages alternating with entry and exit passages.

The cattle divisions are of cast iron and are spaced at a sufficient distance apart to accommodate two animals. Each stall is fitted with two glazed fireclay drinking troughs, which can be supplied with water from flexible hose in the feeding passages, towards which the beasts stand head to head.

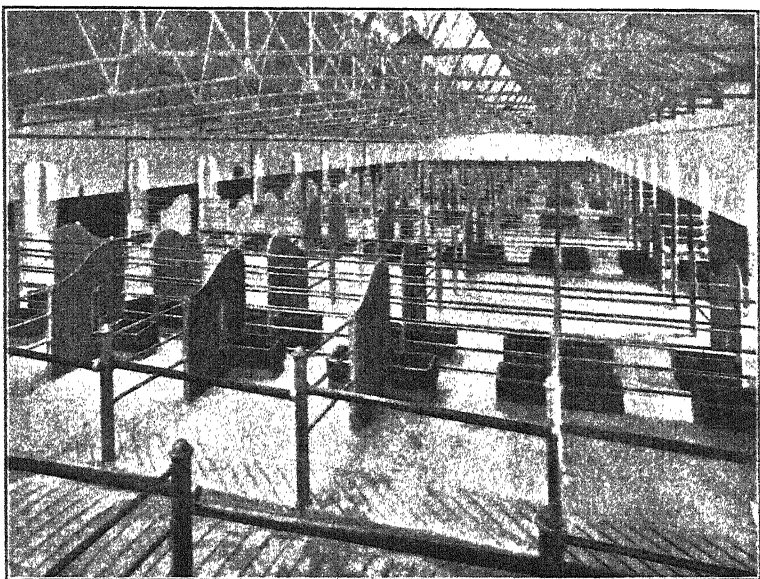
The cattle slaughter hall has been designed somewhat on the lines suggested in the report of the Admiralty Committee on the Humane Slaughtering of Animals, in order to combine as far as possible the advantages of the separate and open hall systems, to overcome the objections to both and to economize space.

The open hall is ideal for inspection and cleanliness, but from the point of view of humanity cannot compare with small separate slaughter rooms where beasts can be killed and dressed one at a time, and the room cleaned down after each killing.

The slaughter hall is 220 ft. long by 40 ft. wide, and is separated from the lairage by an open passage 15 ft. wide. Inside the hall abutting upon the passage there is a range of twenty slaughter pens with doors opening on the passage opposite the doors of the lairage so that cattle can easily be roped across. The pens, which are 10 ft. 6 in. wide by 14 ft. long, have division walls of glazed brick 6 ft. high, with door openings 5 ft. wide communicating with the common hall. With this arrangement



Main Entrance to the New Municipal Abattoir.



Cattle Lairage.

each beast can be killed and bled separately in an enclosed pen, transported to the open hall, and dressed under proper supervision and inspection, and the pens can be thoroughly swilled down after each killing.

Owing to the necessity for transporting carcasses from pens to the dressing hall extra labour is involved, but by the introduction of electric lifting and transporting hoists all disadvantages of the system have been overcome.

The average time required for killing and dressing a beast is about three-quarters of an hour, that is to say, fifteen minutes in the pen for killing, bleeding, &c., and thirty minutes in the open hall for dressing and making ready for removal to the hanging hall. As each beast killed in the pen has to be transported to the dressing hall, and as the time required for dressing is twice that of killing and bleeding, one transporting hoist and two dressing hoists have been provided in the dressing hall opposite each pen.

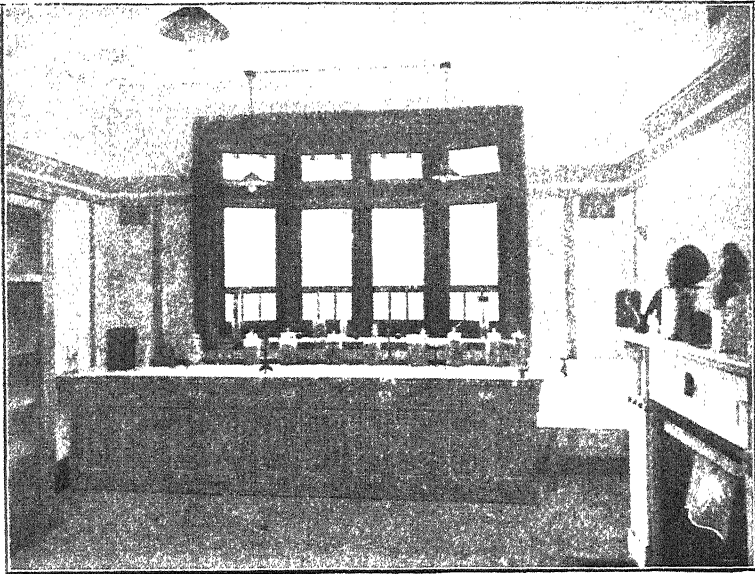
When a beast has been killed and bled it is transported to the dressing hall, to the necessary position under either of the lifting hoists which may happen to be vacant, and from that point the dressing is proceeded with in the ordinary way. The carcasses when completed are transported to the hanging hall over a system of twin bar runways connected therewith. The possible rate of killing and dressing at a conservative estimate will be 80 beasts per hour.

The cooling or hanging hall is 166 ft. long by 48 ft. wide, and is separated from the dressing hall by a covered passage, 15 ft. wide, in which the gut cleaning tables are located. The hanging hall is completely fitted up with twin bar runways, and will accommodate 544 carcasses.

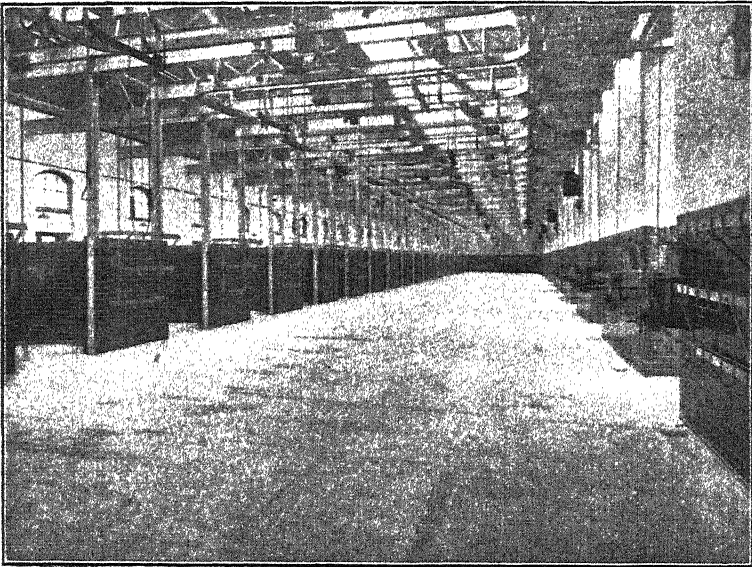
When the carcasses are sufficiently cooled they can be transported along the runways and stored in chill rooms, or lowered into butchers' carts under a verandah abutting upon the main roadway through the abattoir.

In connection with the cattle department there are two isolated stalls for animals suspected of disease, a separate slaughter room and hanging room for suspected meat, and a condemned meat room containing a digester for dealing with meat unfit for food.

In the sheep department there is a separate building for sheep



Veterinarian's Laboratory.



Cattle Slaughter Hall.

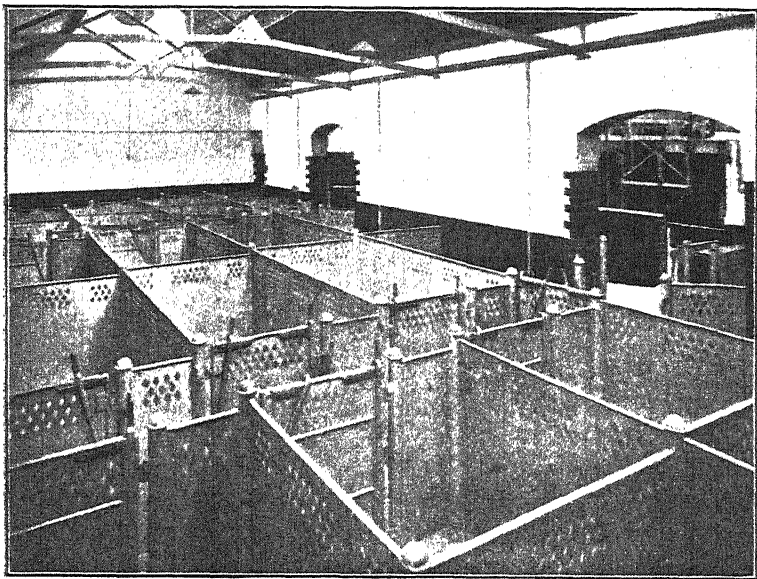
lairage which will accommodate 850 sheep, a sheep slaughter hall containing thirty-six killing stools, with six adjacent pens for sheep to be immediately killed, and a sheep hanging hall fitted with hanging rails, and hooks to accommodate 700 carcasses.

The sheep slaughter and hanging halls are separated by a 16-ft. covered passage, which is intended to be used for the removal of fleeces, offal, and manure, and as it has been provided with rails and hooks it can also be used for the slaughter of calves or sheep if occasion requires.

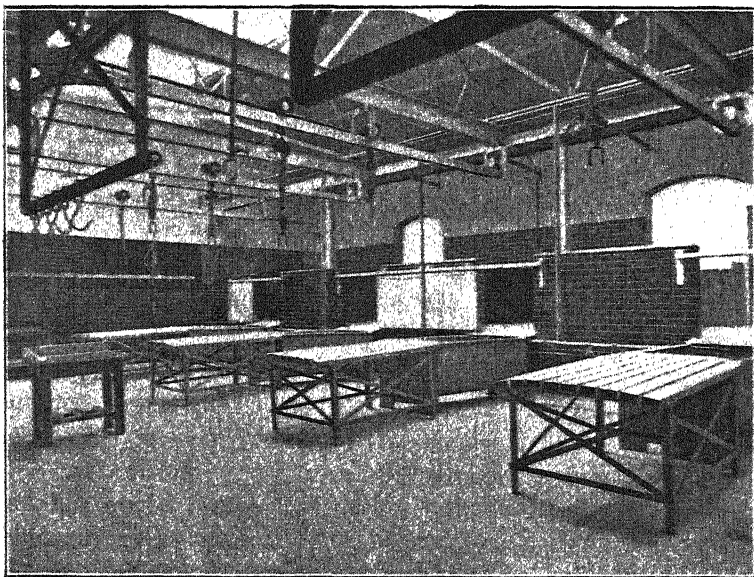
In the pig department there is a lairage with accommodation for 200 pigs, a slaughter hall with four stunning pens, four scalding tanks, and four scutching tables, and a hanging hall which will accommodate 250 carcasses. The floors of the lairage and stunning pens are raised to the level of the tops of the scalding tanks so that pigs after killing can be transferred to the tanks without lifting tackle. The slaughter hall and hanging room are provided with a complete system of twin bar runways over which the carcasses of the pigs, after scraping, can be transported to the dressing hooks in the slaughter hall, or to the hanging hall by trolleys with quick rope hoists attached.

To make the operation of killing as cleanly as possible a stomach cleaning department has been provided adjacent to, and in direct communication with, the tripery. The department contains two floors, the ground floor being a stand for carts or trucks to remove the manure, which will be discharged through a chute from the upper floor where the stomachs will be slit and cleaned. The upper floor is provided with a cleaning bench over the chute and with cold water washing tanks, and the stomachs after cleaning and cold washing will be delivered direct to the receiving tables in the tripery by inclined galvanized iron chutes. The tripery has been constructed in duplicate so that it can be let to two separate firms; it is completely fitted up with scraping tables, galvanized iron cold and hot water tanks, tripe boilers, glazed fireclay storage tanks, hooks, and draining shelves and discharge counters so that the stomachs, &c., received at one end can be discharged after preparation at the other.

Separate rooms have been set apart for the extraction and drying of serum from the blood, and for the preparation and dressing of guts, each being provided with the apparatus and appliances necessary to its trade.



Pig Lairage.



Pig Slaughter Hall.

The chill rooms, which are being constructed on the abattoir site in a central position relative to the various departments, will be fitted with twin bar runways (in direct connection with the cattle and pig hanging halls), and with sheep and pig hanging rails and hooks. There will be an internal passage forming an airlock and four separate chambers, either or all of which can be used for chilling or cold storage. It is at present intended to use one of the chambers for general produce, and the remaining three chambers for abattoir purposes, which would provide accommodation for about 15 per cent. of the total capacity of the hanging halls for cattle, sheep, and pigs.

MACHINERY AND EQUIPMENT.

The dressing hall is equipped with sixty hoists, forty electrically driven and specially designed, and twenty hand-operated. The electric hoists are of the worm gear type built up in pairs, one for hauling out and one for dressing; they are driven by electric motors through line shafting in series of eight, and are so arranged that current will only be used when one (or more) hoist in each series is actually working. The electric control switches, which have been specially designed, are connected with the clutch fork levers of the hoists so that the starting of any hoist is performed by one operation. The clutch forks are held in position during the time the hoists are lifting and are pulled out by springs immediately the handles are released, so that no machinery will be in motion unless one (or more) clutch is being held in. Lowering is effected by releasing band brakes normally kept in position by springs, and the control levers must be held down during the whole time of lowering as the springs put the brakes on immediately the lowering handles are released.

The cambrils are of the double-rope type, so designed that when the carcasses carried are split down the back the two sides automatically gravitate to a central position ready for transference to the runway. The runway is very substantially constructed and of the twin-bar type, which requires no movable points, and there are, therefore, no movable parts to get out of order.

The runway trolleys are fitted with ball bearings and have double hooks which enable two sides of a beast to be transferred from hoist to trolley at one operation.

The whole of the drainage from the cattle dressing hall will

pass through a specially designed fat screen which will automatically remove the particles of fat and deposit them in a receptacle provided for the purpose. The screen is of 1/16 in. mesh wire gauze in the form of an endless belt, placed at an angle of 30° to the horizontal. The screen is driven by a motor, and the particles of fat arrested and carried up on the screen will be automatically swept by a rotary brush into a portable receptacle.

Two Lancashire boilers have been installed to provide steam for the hot-water supply for the piggery scalding tanks, and for power purposes. Hot water is generated in a Royle's Calorifier placed in the boiler house, and is conveyed to various points in the cattle, sheep, and pig slaughter halls and tripery, by a system of circulating pipes.

The refrigerating plant consists of a steam-driven ammonia compressor and double pipe ammonia condenser located in the engine house, and the cold storage rooms are cooled by circulating air with a motor fan through a cooling battery of galvanized plates cooled by brine, which, together with the brine cooler, will be placed in a cold storage building.

The digester for condemned meat will be fed by steam from the boilers, and the necessary vacuum created by a water ejector fed from the public supply. The digester will not only render the condemned meat completely sterile, but will enable the fat to be separated, and leave the flesh and bone in a condition suitable for manure.

The whole of the buildings, roads, and passages are lighted by electricity, and the current required both for lighting and power is taken from the public supply through a main switchboard located in the engine house.

The total cost of the abattoir and equipment has amounted to £52,000.

MEAT INSPECTION.

Every arrangement which experience and inquiry could suggest as necessary or desirable for the protection of the health of the consumers of meat has been adopted, in order that, so far as it is possible to do so, all meat sent out from the abattoir will be sound and fit for human consumption. The responsibility for the efficient inspection of all animals killed, and meat sent out for public consumption, is entrusted to the City Veterinarian,

Mr. J. A. Jordan, M.R.C.V.S., who is assisted by five experienced inspectors.

Three of these inspectors are constantly on duty during the working hours of the abattoir, and inspect every carcase and organ immediately the animal is slaughtered. If the inspectors detect any abnormalities, they at once apprise the Veterinarian, who subjects the carcase to a more thorough examination in order to determine if the disease present is of such a nature or extent as to warrant him in seizing the whole carcase, or whether it might be possible for him to pass it after removal of the diseased parts.

In deciding as to the fitness or otherwise of the flesh of tuberculous animals, generally speaking the recommendations of the Royal Commission on Tuberculosis in 1898 are taken as a basis. Any deviation from this is determined according to the degree of extension, stage, and intensity of the pathological process, and according to the general nutritive condition of the carcase.

All carcases and organs that have been seized are immediately removed to a store set aside for the purpose, where they are kept for a reasonable time in order to give the owner an opportunity, if he desires, of having another expert's opinion. They are then taken before the Justices of the Peace, under surveillance of one of the meat inspectors, who, in accordance with Sections 132 and 133 of the Public Health (Ireland) Act, 1878, applies for an order for their destruction. When this Order has been granted, the condemned carcases and organs are conveyed back to the abattoir, where the most up-to-date plant—known as "Scott's Patent Vacuum Destructive Digester"—has been installed for the treatment of condemned meat.

The operation of destruction is carried out in a thoroughly sanitary manner, and it is hoped that valuable commercial by-products will be the result, so that butchers using the abattoir may receive a fair return from the residue of their confiscated carcases.

MEAT INSPECTION DEPOT.

By Act of Parliament (1899) power was granted to establish a depot for the purpose of inspecting all meat prepared outside the city boundaries before being exposed in the city. This establishment is in the Grain Market, which has an opening from

both Chichester Street and May Street. It is opposite the Police Courts, so that when it is necessary for the magistrates to view meat which has been seized prior to granting the order for its destruction, little of their time is occupied in doing so. It is open daily (Sundays excepted) from 8 to 10 a.m., during which hours an inspector is in constant attendance. Mr. Jordan himself attends every morning about 10 o'clock. Overhead rails, with pulley blocks and chains attached, are arranged in this building, so as to facilitate the easy handling of carcasses.

For the purposes of inspecting pork which has been prepared outside the city boundaries one of the inspectors is in attendance daily at the pork market from 8 a.m., and inspects all pork exposed for sale therein. If, on inspection, he finds lesions of tuberculosis or other disease he at once informs Mr. Jordan, who attends and decides as to its fitness for human food or otherwise.

Daily visits are paid to the butchers' shops, pork shops, and stores in the city. Last year, 4,940 visits were made, when all meat exposed for sale was carefully inspected, with the object of detecting any signs of decomposition.

Railway stations, hide marts, cold storage, fish and fruit markets also received due attention, daily visits being made to them.

MEAT STAMPING.

The Chairman of the Markets Committee (Dr. Henry O'Neill) has always taken a keen and lively interest in matters pertaining to the health of the people, and he has for many years advocated the stamping of every carcase and organ intended and passed as fit for human food, and he is of opinion that until the public demand this they will have no guarantee that the meat they purchase has been inspected and passed as sound, or that they are being served with the quality asked for.

Being personally acquainted with the butchers' objections to these indelible ink rubber dies, the City Veterinarian (Mr. Jordan) has invented and patented an electric device which certainly should facilitate the operation of branding or stamping meat. It is portable, makes a clean, absolutely indelible, and unobjectionable mark upon the meat, and can be made instantly ready for use.

It consists of a portable stamp or brand holder, upon the face of which any desired metallic or other stamp or brand may be removably secured; between this stamp and the holder resistance

coils are suitably arranged above a portable plate affixed to the holder, the coils being suitably insulated. When an electric current is passed through the coils, heat is generated, and the brand being subjected to this heat the temperature is raised to such a degree that on placing it against the meat a corresponding mark or brand is obtained thereon.

HOME MEAT STAMP.

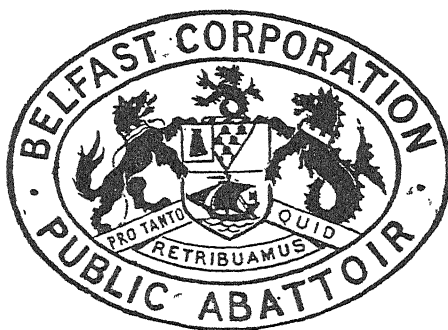


Fig. 1.

Indelible Ink Rubber Stamp used by the Meat Inspectors of the "County Borough of Belfast" for carcasses slaughtered within the Public Abattoir after the meat has been examined and found healthy and fit for human food.

FOREIGN MEAT STAMP.



Fig. 2

Indelible Ink Rubber Stamp used by the Meat Inspectors of the "County Borough of Belfast" for carcasses slaughtered outside the Borough Boundary of Belfast, and brought for inspection to the Meat Inspection Depot.

The supply of electricity may be obtained from any suitable source, such as a portable battery, or by means of a flexible connection from a public supply.

In order to promote humane methods in the slaughtering of animals intended for human food the Markets Committee are providing a number of Ransom's Patent Air Killers. This new killer is not a firearm, but it is worked by compressed air, consequently safe in the hands of the most inexperienced.

REPORT ON SOME OBSERVATIONS MADE AND WORK
DONE AT THE PASTEUR INSTITUTE, TUNIS.*

BY CAPTAIN A. C. H. GRAY.

Royal Army Medical Corps.

THE town of Tunis, the capital of Tunisia, is easily reached from Marseilles by the "Transatlantique" line of steamers. Passenger steamers leave Marseilles harbour every Monday and Wednesday at midday. The journey lasts thirty-two hours.

The Pasteur Institute of Tunis is situated at the northern extremity of the town, opposite the Belvedere Gardens. A tram from the centre of the town takes one to the door of the Institute, the journey taking a quarter of an hour.

The principal building contains a large general laboratory for the preparation of culture media, &c., separate laboratories for the director and his staff, hot and cold incubating-rooms, a waiting-room, and an inoculating-room for those attending for anti-rabic inoculation, and also a large library. In the basement of the building are laboratories for the preparation of the anti-rabic injections, and a warm room in which the spinal cords are dried.

A large single-storied annexe contains a laboratory for the preparation of calf lymph and stabling for the calves. In this building are housed all the experimental animals, chimpanzees, monkeys, dogs, rabbits, and guinea-pigs; it stands in the grounds of the Institute some fifty yards away from the principal building.

As the Institute is situated more than a mile and a half from the centre of the town, a bureau has been established in the town, to which the public can bring products for analysis, &c., and where serums and vaccines made at the Institute can be bought.

The principal departments of the Institute are:—

- (1) For the preventive treatment of rabies.
- (2) For the preparation and distribution of calf lymph. About 50,000 doses are distributed every year, and, in addition, any person who wishes it can be vaccinated at the Institute free of charge.
- (3) For the chemical analysis and microscopical examination of products and pathological material.
- (4) The fermentation department for the distribution of selected yeasts.

* Abstracted by permission of the Editor of the *Journal of the Royal Army Medical Corps*.

Other vaccines, such as tuberculin, mallein, and symptomatic anthrax vaccine, not made at the Institute, are distributed to the public. Medical leaflets on the local diseases are written and distributed broadcast.

In addition to all the routine work of the Institute, the Director, Dr. Ch. Nicolie, and his assistants, find time for research work on a large scale, and it is this work which has given the Institute its world-wide reputation.

It would be difficult for me to exaggerate the kindness with which I was received at the Institute. A special laboratory was put at my entire disposal, an attendant was told off to help me in the *post-mortem* examination of the dogs. Everybody, from the Director downwards, went out of his way to show and explain things to me, and it was with feelings of genuine regret that I said good-bye when my two months were over.

PREVENTIVE TREATMENT OF RABIES.

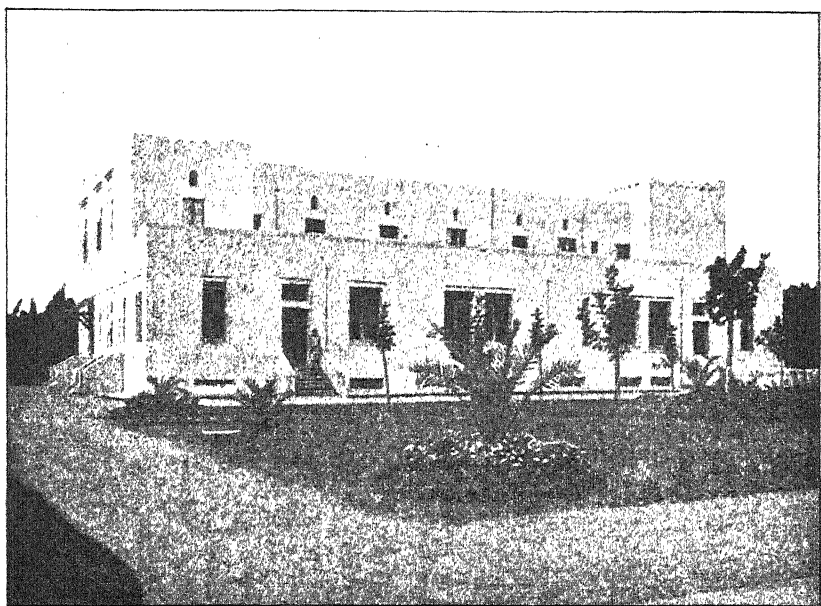
The preventive treatment of rabies was of great interest to me, as I had never seen anything of the kind before. This is really the main work of the Institute, and the whole of the basement of the building is given up to it. Through the kindness of the Director I was allowed, after learning the methods, to perform autopsies and prepare the injections myself.

Calmette's modification of Pasteur's original method, *i.e.*, the use of glycerinated spinal cord, is the one used.

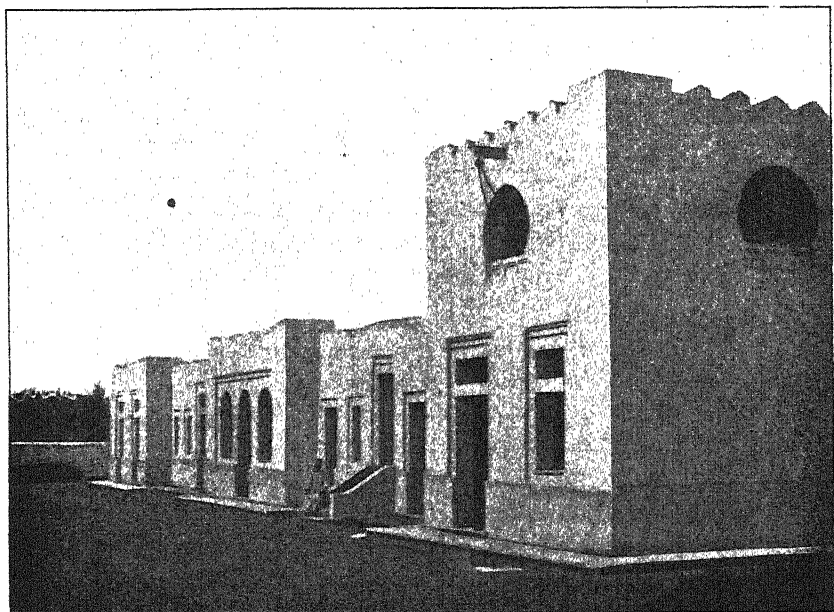
Rabies is still of frequent occurrence among the dogs of Tunis. Preventive treatment was started on January 1, 1905, and more than two thousand patients were treated at the Institute in the first year. All stray dogs in Tunis are captured and destroyed, the local police being very vigilant in this respect. All dogs without collars are caught and taken to the municipal fourrière. If not claimed by their owners within a week they are destroyed in a lethal chamber with coal gas. In this way about a thousand stray dogs are got rid of every year.

The rabbits used for inoculation are specially selected for their large size, and are kept under observation for a month to ensure that they are in good health. Three or four rabbits are inoculated at a time. The inoculated rabbits die of rabies on the eighth day.

The bottles containing the pieces of cord are kept in an ice-chest. The cord is kept for at least ten days in the glycerine



Pasteur Institute, Tunis (from the Grounds).



Pasteur Institute, Tunis. Annexe.

before being used, and will retain its full potency for several months. Enough material is always kept at the Institute to treat a hundred patients.

The injections are prepared just before use. A list of the number of injections of the first (or fixed virus), second, third, and fourth day cords is made out each morning. The weakest injection is prepared first. The right number of pieces of cord are removed from the bottle with sterile forceps and are put into a sterile glass measure, the bottom of which is of ground glass. The cord is then mashed up with a sterile glass rod. After a thorough mashing sterile saline is added, a few drops at a time. When thoroughly emulsified, the total bulk of fluid is added, allowing 5 c.c. of saline for each injection, so that if enough cord for twenty people had been taken from the bottle, the emulsion would be made up to a bulk of 100 c.c. Each strength of spinal cord is emulsified in this way.

The patients attend at the Institute for their injections at 8.30 in the morning. First come those who are to have the mildest injections (*i.e.*, fourth day cord). A 10 c.c. glass syringe, fitted with an expanding rubber piston, is used. The needle is of steel, short and rather stout, and is kept very sharp. The syringe is sterilized, before use, by boiling. The emulsion is drawn up into the syringe to the 5 c.c. mark. The patient's flank is exposed, and a dab of iodine is applied with a wooden piston.

The needle is inserted through the dab of iodine and the injection given subcutaneously. The needle is then withdrawn and a fragment of cotton-wool pressed over the spot. The syringe is sterilized once for each series of injections. Between each injection the needle is dipped into a pot of boiling boracic solution.

Two methods of dosage are used at the Institute: (1) Ordinary; (2) intensive.

In both systems one dose only is given daily. The amount of cord given is always the same. The injection is always of 5 c.c. bulk.

Twenty-five injections are given in thirty-three days. The intensive treatment is used for: Bites on the face; deep and penetrating bites; and for those cases in which treatment has been delayed. In all other cases the ordinary treatment is used.

Canine Leishmaniasis.—Soon after my arrival at the Institute, Dr. Nicolle suggested that I should carry out a further examina-

tion of the dogs in Tunis just as he had done in 1908, and the Yakimoffs in 1911. Nicolle examined his dogs during the months, March, April and May. The Yakimoffs examined theirs between January and May. Both these investigators found a very similar percentage of infected dogs, the former 1·8 per cent., the latter 1·6 per cent. at Algiers. The brothers Sergent, during the months of July, August, and September, had found as many as 7·2 per cent. of the dogs to be infected. This great difference in the percentage of infected dogs in two towns, not so far apart, where the conditions of life seemed identical, might be explained by the fact that in Algiers the dogs were examined in the summer months, in Tunis much earlier in the year. I was to examine the dogs in Tunis during October and November; if my figures agreed with what had already been found in Tunis, then some other factor than the season must be responsible for the large number of infected dogs in Algiers.

From figures already published which I have put in tabular form, it is evident that there is a very great difference in the number of infected dogs found at various places on the shores of the Mediterranean.

Place	Dogs examined	Number infected with <i>Leishmania</i>	Percentage
Tunis, 1908	222	4	1·8
Tunis Suburbs	5	0	—
Gafsa	21	0	—
Sfax	5	0	—
Tunis, 1911	299	5	1·6
Algiers	125	9	7·2
Bordanaro (Messina)	33	27	81·8
Rome	60	16	26·6
(Lisbon)	300	8	2·6
Malta	83	7	8·4
Athens	184	15	8·1
Piræus	40	3	7·5
Catania	275	3	1·09
Palermo	227	0	—

I examined dogs in Tunis between October 16 and December 5, as follows:—

Date	Number of dogs	Date	Number of dogs
October 16	13	November 13	9
„ 17	3	„ 15	2
„ 21	2	„ 19	3
„ 23	19	„ 20	7
„ 30	15	„ 21	10
November 2	1	„ 25	3
„ 4	2	„ 27	5
„ 6	20	„ 28	2
„ 8	1	December 2	1
„ 9	2	„ 5	7
	78		49
			78
		Total	127

Out of these 127 dogs I found two infected with *Leishmania*, that is to say, 1·6 per cent., an exactly similar result to that obtained by the Yakimoffs in 1911.

The first infected dog found was the forty-eighth examined; the examination was made on October 30, 1912. The second infected dog was the ninety-ninth examined; the examination was made on November 20, 1912.

Dog 48. October 30, 1912.—Brought in eighteen hours after death. A full grown black and white dog. Neither emaciated nor obviously anæmic. Its coat was in good condition, there was no loss of hair. *Lungs* and *heart* normal. The *spleen* was considerably enlarged, being about twice as large as the normal for the size of dog. It was pale and rather granular-looking; its consistence was normal. *Liver* normal. *Bone-marrow* of a bright red colour all through the bone. *Kidneys* were pale, but not otherwise abnormal. Numerous *Leishmania* parasites were found in the bone-marrow of this dog; in the spleen smears parasites were rare; in a smear from the liver, one parasite was found after a prolonged search.

Tubes of N.N.N. medium were inoculated from the bone-marrow of this dog, and a good growth of typical flagellated parasites resulted. In addition, two dogs were inoculated intraperitoneally with 4 c.c. and 3 c.c. respectively of a thick emulsion of spleen pulp in physiological saline solution. These two dogs were in good health when I left the Institute on December 13.

Dog No. 99. November 20, 1912.—Brought in twenty hours after death. A small emaciated black puppy; several patches quite bare of hair were present on the body, one of which was as big as the palm of the hand. *Eyes* were normal. The animal was very anæmic. *Heart* and *lungs* normal. *Spleen* was not obviously enlarged; it was pale and soft. *Liver* was pale, not enlarged. *Bone-marrow* uniformly red and very liquid. *Kidneys* were pale. Smears from the various organs showed that this dog had suffered from a very intense infection. In the bone-marrow the parasites were the most numerous. In the spleen and liver smears parasites were seen in large numbers. In a film of blood taken from the portal vein parasites were numerous.

Two monkeys and two dogs were inoculated with spleen pulp from this dog, and so far as I know these animals are still in good health. Tubes of culture medium were also inoculated, but these were contaminated.

As was pointed out by Basile, and again by the two Yakimoffs, it seems that canine Leishmaniasis may exist in two forms: An acute form, from which Dog 99 suffered, which attacks puppies and kills them in three to five months; in this form parasites are very numerous in the internal organs and even in the blood-stream, but splenic enlargement is not pronounced. A chronic form, Dog 48, in which the animal does not appear to be ill, and the disease is only discovered by *post-mortem* examination; in this form parasites do not appear to be numerous, but there is considerable enlargement of the spleen.

The cultural forms of *Leishmania canis* have been so often and so accurately described by Nicolle, Basile, the Yakimoffs, and other observers that a further description would serve no useful purpose.

Equine Clinicals.

A COMPLICATED CASE.

By A. R. ROUTLEDGE, F.R.C.V.S.

Louth, Lincs.

Subject.—A well-bred yearling Shire colt in good condition. Admitted to infirmary September 13, 1912. A true right abdominal testicle removed, weight 2 oz., the left being in the scrotum, weight 9 oz.; both by Dewar's ecraseur. Seen to be comfortable at midnight.

September 14, 6 a.m.—Lost a quantity of blood during the night from the left side, a clot hanging from the scrotal wound continued to drip till 9 a.m.; pulse 100, temperature 102° F., slightly uneasy, blowing, sobbing, partial erections. Gave a feed and drink of chilled water at 3 p.m.; arterial blood immediately commenced from the left side, it soon stopped. 6 p.m.: pulse 84; temperature 102° F.; has staled twice; no action of bowels; easier appetite; straw coloured serum dropping from left side.

September 15.—Pulse 106; temperature 104° F.; respiration 60; blowing and sweating; appetite *nil*; drank half a bucketful of sloppy bran and immediately commenced to bleed from near side; clot removed, the scrotum being packed with wool saturated in strong solution of alum and sutured up; continued to bleed at intervals all day through the stitches. At 4 p.m. venous blood commenced to ooze from the right operation wound. 10 p.m.: pulse 126; temperature 104·6° F.; respiration 46; eagerly drank oatmeal gruel, nibbling clover, &c.; penis is pendulous, remaining so permanently.

September 16.—Pulse 112; temperature 103·6° F.; general improvement; dark coloured serum from right-side operation wound; penis suspended all day.

September 17.—Pulse 99; temperature 104° F.; blowing uneasy; not cleared up; dressed right operation wound; symptoms of laminitis; removed front shoes; poulticed feet; slight improvement towards night.

September 19.—Pulse 80; temperature 103·6° F.; respiration 22; sheath considerably swollen; fair amount of pus from the operation wound.

September 26.—Pulse 70; temperature 101.4° F.; walked to field very weak; would not graze; very dull all day, but seemed brighter at night.

September 28.—Pulse 65; temperature 101.2° F.; refused breakfast; at 10 a.m. passed a very sloppy offensive motion; gradually increasing symptoms of gastric disturbance presented; eructating gas; sweating profusely; easier about 7 p.m.

During the time he was in pain the penis became almost normal, only to afterwards become as bad as ever. Gradual improvement. Colt sent home October 14. Wounds healed up, but the penis absolutely pendulous.

May 27, 1913.—Admitted to infirmary, cast and chloroformed, and amputated the penis by elastic ligature. For a full account of operation, see p. 61 of Cadiot and Dollar's "Clinical Medicine and Surgery." A brief description of method of operation: Penis drawn well forward and tourniquet applied to its base; metal catheter passed. A triangle of skin and subcutaneous tissue dissected out down to the urethra. The urethra is then divided transversely on to the metal catheter. Then, longitudinally the flaps reflected and sutured with fine silk to the edges of skin in the form of a triangle. Several turns of a tightly stretched rubber cord applied round the penis, the paralysed portion removed with a bistoury.

During the next three days passed arterial blood from the stump and urethral incision after urinating. The stump end and ligature came off on June 6, the sheath being swollen to half the size of a football. Turned out to grass on June 7. On June 15 badly colicked in field; sweating and crouching; no urinary obstruction; remains on ground a lot with forelegs out as though in the act of rising. Gradually recovered and sent home on June 23.

Owner wires, July 16, colt unable to stale. My locum, Mr. H. Hicks, M.R.C.V.S., visited and found penis end healed up to a straight line; the urethral opening about the size of the lead of a pencil. The horse was cast and the end laid open.

Sent to infirmary August 23 as bad as ever. Cast, cocaine injected and the cicatricial tissue divided. The urethra dilated with a pair of forceps and a silver catheter, 5 in. long, $\frac{5}{8}$ in. diameter, with two rings at the external end inserted into urethra and kept in position by deeply placed sutures into penis stump.

Pressure from behind tended to push the urethral tube out and make the sutures cut. They were renewed (standing) about once a fortnight and the tube kept in till September 15 a bone bougie being passed daily till September 30, on which date the colt went home, the owner being instructed to pass the bougie twice a week.

I examined him at the end of January of this year. The urethral orifice readily admitted my first finger. The colt urinates freely and is apparently quite cured.

CLINICAL NOTE ON TWO CASES OF SPAVIN WITH LARGE EXOSTOSIS, TREATED BY DIVISION OF THE CUNEAN TENDON OF THE FLEXOR META- TARSI.

BY CAPTAIN PERCY ARGYLE, F.R.C.V.S., A.V.C.

Cavalry School, Netheravon.

Case 1.—Subject: Bay mare, "Polka," aged 7. This was a well-bred animal, and had been used as a demonstration horse for show jumping. On September 2, 1912, she was brought in lame on the near hind leg, and on examination was found to be suffering from spavin. There was a distinct bony enlargement of the inner aspect of the hock, the toe of the shoe was worn, and there was a bruise of the horn around the toe. The mare was sent to the Station Veterinary Hospital, Bulford, and was there treated by five pyro punctures with the ether cautery. After ninety-four days on the sick list she was discharged to light duty, relieved on January 4, 1913.

In about three weeks she began to go very lame again, and there was a large, diffuse bony enlargement all over the inside of the hock. She walked lame, and could hardly put the foot to the ground. After a conference with the veterinary officers at Bulford it was decided to perform cunean tenotomy.

The heels of the shoe were considerably thickened and the mare sent to hospital. On February 26, 1913, she was cast, chloroformed, and the inside of the hock washed with ether soap, shaved, and painted with tincture of iodine. I made an incision about an inch in front of the chestnut, obliquely downwards and forwards. The skin was closely adherent to the subcutaneous tissues, especially at the points where the cautery had penetrated,

and the tendon was with difficulty identified and isolated. One puncture had penetrated it.

After freeing it as far as possible it was raised from its bed on a blunt tenaculum and divided, but I did not remove any of it. I closed the wound with two silk stitches, and the mare was allowed to rise. She was kept on the pillar chains that night, and the following day was led out for half an hour's walking. This was repeated each day and the stitches held. At the end of a week the wound was practically healed and the stitches were removed.

After a fortnight the mare was trotted and went almost sound, and she was discharged from hospital to light duty on April 27 after twenty-nine days.

She remained at light work for a fortnight, and was then put to her regular duty. She remained quite sound until May 8, when she was transferred for issue as a charger.

Case 2.—Subject: Bay gelding, aged 4, "Derelict." Joined the cavalry school on April 3, 1913, commenced training, and was doing very well.

After three months the animal became very lame on the near hind leg—so lame that it went on three legs at times. There was a diffuse exostosis over the inside of the hock, hot and painful to pressure. As in the preceding case, the toe of the shoe was worn and the horn of the toe was bruised. There was a scar on the inside of the hock which appeared to have been caused by previous treatment, so I decided to try the operation again.

The heels of the shoe were thickened, and the same procedure was adopted as before. On dividing the skin I could find no traces of puncture, but there was a good deal of inflammatory thickening of the subcutis. After isolating and dividing the tendon I closed the wound with two silk stitches. These stitches did not hold, as the scar tissue was very thick.

The horse was put to walking exercise next day, and this was continued daily. His action improved every day, and after thirty-eight days—on August 1—the horse trotted quite sound. The animal was discharged to duty on the 12th, the wound having completely healed. The patient has done its work quite satisfactorily until the present time.

FIBRINOUS PERICARDITIS AFTER STRANGLES.

BY CHIEF STAFF VETERINARY-SURGEON HOSE.

ON August 6, 1913, a remount fell ill with a bad attack of strangles. At first the animal showed symptoms of angina, also its general condition was considerably disturbed and the taking of food much hindered. The number of rather strong pulse-beats was 50; the respirations 16; the breathing gasping and laboured. Rectal temperature 40·1 C. Patient received a sharp rubbing round the larynx. In the course of the next day the breathing was free and the patient showed good appetite. On August 9 both submaxillary glands and the parotids swelled and suppurated after a short time. On August 15 the patient seemed quite lively, had a very good appetite, and was put in the convalescent stable.

On August 26 the patient seemed less lively and only moved about unwillingly; he was brought into a box in the sick stable. Examination showed a weak pulse, 60 per minute; respirations 14; and rectal temperature 39·0 C. Appetite was small; movements avoided as much as possible. Patient received three times daily 10·0 grm. of oil of camphor, and once daily 10 grm. of potassium iodide. The condition of the horse got gradually worse. Clinical examination always showed a weak action of the heart; the heart-sounds were weak and not plainly audible, but the diagnosis was negative. Treatment as before.

On August 31 a friction sound was heard in auscultation which synchronized with the heart's action. In spite of increased camphor oil injections the heart weakness always increased. On September 3 the patient got down and could not be raised. The number of the pulse was no longer countable. Through increasing weakness the patient died on September 4 at four o'clock in the morning without any death struggle. *Post-mortem* was made five hours afterwards.

Autopsy.—The cadaver very moderately nourished; the visible mucosæ cyanotic; the natural openings of the body closed. Nothing unnatural in the abdominal cavity; situation and appearance of intestinal canal normal. Liver, spleen, kidneys and mesenteric glands somewhat enlarged and not so firm as normal. The peritoneum is smooth, glistening and transparent.

On opening the thoracic cavity the heart with the pericardium seemed about 45 cm. higher and 38 to 40 cm. broader at the base, a bluish-grey shimmering sac that was apparently chock-full of

fluid. In the pericardial sac there was about 10 litres of amber-coloured turbid fluid in which large clots of fibrin floated. Pericardium and epicardium are covered with a 5 mm. thick, hard-to-remove fibrin layer, which was rough and dark red. At the right side of the apex of the heart these fibrin masses were coloured dirty brownish red. The heart was compressed and small; its muscular tissue firm and reddish grey. The valvular apparatus showed no changes. The pleuræ were injected throughout, but smooth and glistening. Both lungs contained air and through compression of the enlarged heart showed atelectic areas. On the external surface of both lungs there was rib pressure, but no indication of previous lung. *Post-mortem* of the head and neck was negative.

Death resulted from paralysis of the heart.

Diagnosis.—Hydrops pericardii, fibropurulent inflammation of the peri- and epicardium, atelectasis of single sections of lung.—*Zeitschrift für Veterinärkunde.*

Canine Clinicals.

COMPLETE REMOVAL OF THE PREGNANT UTERUS AND OVARIES IN A BITCH.

BY J. LEGG, B.V.Sc., AND H. R. SEDDON, B.V.Sc.

Veterinary School, Melbourne University.

Subject.—Yorkshire terrier bitch, aged 1 year 9 months, weight 5 lb.

History.—At 10 months old she was first put to the dog, and at the time of parturition she experienced a difficult labour and gave birth to one dead pup. The owner two months ago decided to again put her to the dog, but in view of the previous difficulty he mated her with a small stud dog, "Little Bonzer" (weight 4½ lb.).

The period of pregnancy was normal, and up to the time of parturition the animal was perfectly healthy. She gave birth to the first pup at 7 p.m. on November 18; this pup was dead. The animal soon afterwards appeared to be in trouble; she commenced to show uneasiness, moving about in the box whining, but no

more pups were born. She was brought to the hospital at 3 p.m. on November 19. Examination discovered a pup, which was aliye, in the normal position, so it was decided to leave her for an hour or two. At 8 p.m. traction was applied to the pup inside, but found to be useless, and it was then decided to operate as the pup was apparently of considerable size and the bitch was greatly valued as a pet; 1 gr. of morphine was given and the animal anæsthetized with ether.

Operation.—The animal was secured on her back, and after preparation of the skin an incision was made in the median line so as to avoid the enlarged mammary glands. The abdominal cavity was opened and it was found that the uterus near the os was very congested. As the bitch was very weak and duration of operation a consideration it was decided that it would be better to do a complete hysterectomy than to attempt Cæsarean section. Ligatures were applied to the ovarian ligament and the uterine arteries, and a ligature was being applied to the uterus when the animal collapsed. Artificial respiration was applied and in about a minute she came round. The operation was proceeded with as rapidly as possible, but artificial respiration had to be continued at intervals and inhalations of ammonia given. The ovaries and uterus were removed and the abdominal wound closed.

The bitch recovered well from the anæsthetic and was put in a warm box after being bandaged. Next day she took little nourishment, but thereafter gained rapidly in appetite and strength. The wound healed quickly, and the patient was discharged fourteen days after the operation.

The pup was dead when removed from the uterus and was much too large to have been expelled by the normal passage.

FOREIGN BODIES IN THE STOMACH OF A DOG.

BY PROFESSOR COQUOT.

It is a common thing to hear of foreign bodies in the stomach of a dog. Their form, size and weight are very variable. Some, on account of their dimensions, cannot pass through the pyloric orifice and remain in the gastric receptacle, which tolerates them easily for months (or even years, as M. Nieder has recorded); others are ejected by vomiting, or else they slowly pass along

through the intestines to be expelled with the excreta. In other cases intestinal obstruction may be caused and a surgical operation may be necessitated.

When the diagnosis is prompt a cure can be assured by the simple incision of the intestine (enterotomy), but if treatment has been delayed, and if the intestine has become gangrened, friable or perforated, it will be necessary to excise the affected parts (by the operation of enterectomy completed by entero-anastomosis).

The shape of the object and its weight, rather than its size, are the factors which make expulsion by vomiting easy or difficult; a round or oval pebble is more easily ejected than a flat thing of the same diameter, such as a coin; in the case of the former the dilatation of the œsophageal opening of the stomach and of the œsophagus itself is circular and progressive, and it is helped by the weight of the object and by the hanging position of the head. It is sometimes surprising to see how easily small dogs swallow large objects, which are brought up again just as easily. This is due to the elasticity of the œsophagus and to the remarkable adaptability of the cardia.

The following is a very typical example:—

“Pick,” a fox terrier, 7 years old, was taken out for a walk by his master’s clerk, who amused himself by throwing stones into the river for the dog to bring back. The animal enjoyed the sport, being a good swimmer and very lively.

Next day, however, the animal was in low spirits and appeared to be quite done up and off its feed. It whined frequently and restlessly, kept on changing its position—lying down and getting up—first in one place, then in another. It had, in short, all the symptoms of colic. Towards evening it began vomiting; it brought up water, saliva and mucus enclosing a pebble.

Examination of the abdomen was evidently painful, the animal hardly allowed himself to be touched. In attempting to lift the dog a dull sound could be located, both by palpation and hearing, in the stomach; this was caused by the swallowed stones rattling together.

The patient was allowed to go free, in the hope that the foreign bodies would be excreted in the natural course or else that they would be vomited up.

The following day the owner declared that the dog had not

vomited again, that it had remained moping in the corner of a room, and that no other stones had been passed.

An emetic was then administered as an injection; it consisted of 12 cg. of hydrochlorate of apomorphia in 5 grm. of distilled water. Five minutes after this injection the dog brought up two big stones, then another an hour afterwards, followed quickly by a fourth. The animal then seemed to be getting exhausted, so it was given some coffee with a little alcohol in it. Palpation of the abdominal region still proved the presence of stones. It was like feeling a bag of nuts. During the evening two more pebbles were vomited forth and the dog became livelier; he laid down and slept till morning, when he was quite lively and hungry, drinking milk with avidity. The retching had ceased; there was no longer any abdominal tenderness and no further rattling of stones in the stomach.

The foreign bodies that this dog had swallowed amounted to seven stones; their total weight amounted to 460 grm.; the heaviest weighed 80 grm., the lightest weighed 50 grm., and their sizes varied between that of a hen's egg and a large walnut.

This case is interesting in several particulars. In the first place it is surprising that such large foreign bodies could get into the stomach of such a small dog. Often much smaller objects stick in the œsophagus, but that is because they get fixed by their roughness or their irregular shapes.

In the dog whose case we have been considering, at every fit of vomiting a column of water came up and pushed a pebble along. This slipped up all the better because it was smooth, rounded and heavy.

On the other hand, the enormous weight of the swallowed stones accounts for the animal's manifest suffering. The expulsion of the pebbles produced by the apomorphia is a curious example of the remarkable adaptability of the cardiac orifice during vomiting. If this had not been effective it would have been necessary to operate on the stomach, because the volume of the foreign bodies would certainly have prevented their passage through the intestines.

Abstract.

ON THE CULTURE OF MALARIAL PARASITES AND *PIROPLASMA CANIS*.

BY PROFESSOR HANS ZIEMANN.

*Charlottenburg.**

As you know, former experiments to cultivate malarial parasites *in vitro* were fruitless, until in October, 1912, Bass and Johns published in the *Journal of Experimental Medicine* their detailed methods of artificially cultivating those blood parasites. Bass kindly sent me the preparations for my inspection, so that I was able to prove the correctness of his statements, and to give some details which he had not communicated.†

Unfortunately here in Berlin attempts to procure cases of malaria for the culture of parasites were at first fruitless.

MY OWN CULTURE OF TERTIAN PARASITES.

On January 13, 1913, I was called to treat a case of ordinary tertian East African infection, which led to a strong attack of fever at 2 o'clock a.m. In the blood taken on January 16, at 10 o'clock a.m., when the patient was free from fever, I could, by using Bass's method, ascertain a further development of the parasites, but unfortunately a growth of bacteria soon presented itself. Another specimen of blood taken on January 17, at 6 p.m., proved that there were nearly fully developed parasites in the peripheral blood. I could then follow up the development of two-thirds of fully grown tertian parasites up to sporulation and the formation of young schizonts again.‡

Tertian gametes were still to be seen in the evening of January 20, but in most of the culture tubes growth of bacteria had already begun, and these had caused the disappearance of the schizonts. The reason why I did not succeed in cultivating more than two generations was probably that the malarial blood when transplanted cooled down, or that I had given tannate of quinine 1.0 gr. to the elderly patient, who had a diseased liver, before collecting the blood on January 16.

MY OWN CULTURE OF *PLASMODIUM FALCIPARUM*.

On March 7 a patient came to me who, a short time before, had been in the Cameroons, West Africa, for two years, and had had fever there several times, but in general felt perfectly well. However, on his voyage to and after his arrival in Germany, he had fever for days and weeks, which he either did not treat at all,

* Presented to the meeting of the Society of Tropical Medicine and Hygiene.

† H. ZIEMANN: "On Bass's Culture of Malarial Parasites (*in vitro*) and its Results," *Zentralbl. f. Bakt.*, Bd. 67, H. 6, 1913.

‡ H. ZIEMANN: "On the Artificial Subculture (*in vitro*) of Tertian Malarial Parasites," *Deutsch. med. Wochenschrift*, 1913, Nos. 6 and 8.

or with quite small doses of quinine owing to the fear of black-water fever. The patient said he had lost thirty pounds during the last few weeks. General health moderate; in the peripheral blood little and middle-sized signet ring-forms; temperature at 12 noon 37.2° C., at 6 p.m. chills, temperature 38.6° C., and at 8 p.m. 38.8° C.; during the night, perspiration. A medium degree of polychromatophilia, basophilia, and anisocytosis in the blood. Number of red blood-cells, 2,234,000; Hb, 60 per cent. On March 7, at 12 p.m., blood was taken from the vein at the bend of the elbow by means of a Strauss's needle, and collected in a graduated and sterilized tube tilted to one side and defibrinated. Again, as in the case of the tertian, the blood was mixed with a more or less large quantity of 50 per cent. solution of dextrose, that is to say, 0.1 c.c. of the 50 per cent. solution of dextrose was added to 5.6 to 8.10 and 12 c.c. of blood. To these mixtures were also added a 2 per cent. solution of sodium citrate in more or less large quantities. Modification also took place, as the tubes were kept in dark rooms at a temperature of 37° C. or a temperature of 40° C. The mixtures thus prepared were previously centrifuged in centrifugal glasses at about 800 revolutions within five minutes, to drive the leucocytes from the bottom to the top, and then to transfer the leucocyte-free malarial blood from the middle or the bottom of the centrifugal tubes to the serum tubes. As it had already been proved by previous control experiments with the tertian that a distinct re-development of parasites is not possible without an addition to dextrose, only serum containing dextrose was employed, the serum being non-inactivated and inactivated (one hour at 43° C.). The experiment was made with:—

- (1) Horses' serum.
- (2) Human ascitic serum.
- (3) Human blood serum,

and it was proved that the development took place best when inactivated dextrose-ascites serum was added. The layer of serum was most suitable at about 5 cm. high, the height of the transferred layer of malarial blood being at least $\frac{1}{2}$ cm. I kept this culture, not as Bass proposes at a temperature of 40° C., but more advantageously at 37° C., so that one could bring it into the incubator just before the beginning of segmentation of the parasites, at a temperature of 40° C. The culture appears to be most successful when one puts leucocyte-free non-malarial dextrose-blood at the bottom of the serum tube, and then plants the malarial dextrose-blood upon it. To obtain subcultures I mixed one volume of leucocyte-free dextrose malarial red blood corpuscles in sterilized pipettes with about a ten-fold volume of equally leucocyte-free normal dextrose red blood corpuscles and spread this mixture at the bottom of a serum tube. Bass has said that he very seldom succeeded in developing in one and the same culture more than two successive generations of parasites, but I found in my case, in the two tubes where there was dextrose malarial blood with inactivated dextrose-ascitic fluid, even in a six days' old culture, a constantly repeated increase of the para-

sites. Doubtless, also in the six days' old plasmodium culture, a distinct increase of the parasites took place. It is possible that the addition of dextrose made it more easy for the young merozoites to settle down, the red blood-cells having become more viscous. I have previously stated that I, in many thousands of blood examinations in the Cameroons, succeeded only once in obtaining a form of sporulation of *Plasmodium falciparum* in the peripheral blood. It was therefore very interesting to follow up, in the culture, all the different stages of the development. It was proved that the forms of sporulation of the Cameroon *P. falciparum* do not differ at all from the forms of sporulation found in other parts of the Tropics and in Italy. The number of merozoites was from fourteen to eighteen, in most cases sixteen. The development, from one form of sporulation to the other, lasted in the incubator at a temperature of 37° C. about forty to forty-eight hours. At a temperature of 40° C., the development apparently seemed to take a course only a few hours quicker. It is very interesting to note that in the peripheral blood the infection of the red blood-cells was very scanty, whereas in the culture a four to five-fold infection of the red blood-cells was no rarity. It is important, that in the six days old culture containing a fair number of crescents, males as well as females, no trace of a further development was to be seen, nor any indication of parthenogenesis. Sub-cultures could be obtained from the two days old, and in one instance from the four days old, culture according to the method mentioned above. The patient had to take a course of quinine, as the danger of blackwater fever of course existed; the quantity of quinine was daily increased by 0.1 gr. (tannate, later the hydrochloride). Owing to the good food at the Sanatorium and the treatment with small doses of quinine, the temperature rose during the next attack of fever on March 9 at 8 p.m. only to 38° C. The number of schizonts, too, diminished, whereas that of the crescents augmented.

On March 10 the blood was again taken for the purpose of culture. In the peripheral blood at this time only crescents and very few schizonts were observed. In a seven days old culture no young schizonts were found, the development being poor, and the number of dying-off sporulation forms larger than in the first experiment; probably, because owing to the quinine cure and the stay at the Sanatorium, the virulence of the parasites had decreased, or the resistance of the patient increased. On March 16, at 12 a.m., the temperature being 37.2° C., blood was again taken for culture, at a time when there were very scarce signet rings, and rather a large number of crescents in the peripheral blood. In the last culture the development of the schizonts was still more slight than before, nor was there any development of the crescents. The collecting of the peripheral blood had unfortunately taken place a little too late, when the majority of the parasites had already got into the inner organs for sporulation. On March 18, at 6 p.m., there was a temperature of 31° C. From that time steady improvement of the patient's state of health took place, increased doses of quinine being given. On

March 31 the patient was dismissed with orders for further quinine treatment.

The summary of the cases described above is as follows:—

(1) In a malarial blood—taken in a sterilized state, 5 c.c. of it being mixed with one-tenth of a 50 per cent. solution of dextrose—the malarial parasites showed in the culture exactly the same morphological and biological development as in the human organism. In the culture the development of the tertian parasites took place ordinarily at a temperature of 39.5° C. in about thirty-four hours, that of the *P. falciparum* at a temperature of 37° C. in about forty to forty-eight hours. Occasional differences occur in the development of parasites in cultures as well as in the peripheral blood, as some parasites develop sooner and others later.

(2) Besides the normal, strongly developed parasites, forms have been observed in the cultures with vacuolized plasma bodies and pulverous solution of the chromatin, forms that were never seen in the peripheral blood of the patient. Between these dying-off and normal forms there occur all kinds of transitions.

(3) Sometimes these degenerated forms remind one of the quinine forms in which, as is known, a pale colouring and rupture of the plasma body can be observed, whilst the chromatin at first preserves its compactness.

(4) All the dying-off or degenerated forms are taken up by leucocytes. All kinds of leucocytes co-operate in the phagocytosis in the culture, unless they have been removed by an especially careful centrifugalization.

(5) I could not observe in the culture a conjugation of young schizonts as described by Mannaberg and later by Craig.

(6) Up to now my experiments with tertian and *P. falciparum* in cultures have shown no trace of an indication of parthenogenesis or the formation of ookinetes.

(7) The young merozoites seem to stay only a short time extra-corporeal in the blood plasma. One can see them only when sporulation takes place, and near the sporulating bodies.

(8) I have never seen, in many hundreds of preparations made from the cultures, that the parasites wandered from infected red blood-cells to non-infected ones, as Mary Lawson-Rowley maintains.

(9) Since in my cultures of tertian parasites and of *P. falciparum* the same characteristic and morphological distinctions were found as are admitted for the different kinds of parasites—for instance, Schüffner's dots in *tertiana* parasites, Maurer's spots in *P. falciparum*—the belief of some authorities that the different malarial parasites must be regarded only as varieties of one and the same kind may finally be refuted.

(10) As last year I had myself suffered from a slight recurrence of *P. falciparum*, I could not vaccinate myself with living cultures, but I vaccinated myself with a culture of *P. falciparum* which had died out. This vaccination led only to a slight rise of temperature, 37.8° C., but did not specially alter my general state of health.

(11) Until now I cannot share the belief of Bass that it is

possible to cultivate malarial parasites *ad infinitum* without intervening sexual phases such as occur in the bodies of anopheles.

(12) A report will be made later about experimental influences of light, radium, electricity and the serological analysis as regards diagnosis.

(13) I am prepared to recommend the cultivation of malarial parasites, whenever latent malaria is suspected, so that one might obtain a number of generations of parasites in the culture, and thus demonstrate either the parasites themselves or at least leucocytes containing pigment.

CULTURE OF PIROPLASMA CANIS.

The information Bass has made about the culture of malarial parasites induced me to try, in December, 1912, the cultivation of *Piroplasma canis*. I soon found that the application of Bass's method for the culture of *P. canis* by no means always leads to the desired effect.

Some investigators have already believed that they have seen forms of development of *P. canis* in artificial cultures (Kleine, Nuttall). In the beginning of my research I had no results, and only later, after many experiments, I learned that it was wrong to use dogs with a large number of parasites for the cultures; strong, young dogs, having just got parasites in their peripheral blood, being best fitted for experiment. If there are only larger dogs (more than 3 to 4 months old) at disposal, I recommend that their spleen should be taken out and their blood collected three to four days after the operation (about 30 to 50 c.c. of blood according to the size of the dogs) from the *vena jugularis*. The infection is then always successful.

Similarly to what I found in cultivating tertian parasites and *Plasmodium falciparum*, my experiments again were extremely variable, for I mixed the *Piroplasma canis* blood with human ascitic fluid, human blood serum, dogs' blood serum, horses' blood serum, all of them partly inactivated, partly non-inactivated and partly mixed with sodium citrate in more or less large quantities, and kept the cultures at room temperature, at 37° C., and 40° C. The most favourable results were obtained by using the following technique: One lays open the carotid of a young, strong dog, having yet very few parasites in its blood, and taking the blood by means of a sterilized glass cannula, allows it to run into graduated cylinders with a small neck. It is then defibrinated carefully and for a long time, because the production of air bubbles must be avoided. After this the coagulated fibrin is removed and to each 5 c.c. of blood is added 1 to 10 c.c. of 50 per cent. solution of dextrose (formerly I added that quantity to 8 c.c. of blood), and to 10 c.c. of blood 0.3 c.c. of a 2 per cent. solution of sodium citrate. Then one centrifuges just as in the culture of the malarial parasites, and takes with a pipette the leucocyte-free piroplasma-blood out of the middle or the bottom of the centrifuged tubes and plants it at the bottom of the serum in the culture tubes, which are filled with at least

5 c.c. highly inactivated sodium citrate, dextrose dogs' blood serum, or sodium citrate dextrose ascitic serum. It is best not to make the layers of the red blood-cells too thin, and to proceed just as in the culture of the malarial parasites. It is possible also to get excellent cultures at a temperature of 40° C., and at room temperature. In these a distinct augmentation of the parasites can be observed, but I saw the best development of parasites, especially of chromatins, at a temperature of 37° C., and when I added sodium citrate. After twenty-four hours a considerable increase of the parasites can be observed in the same blood that in the dog itself showed only a very slight infection. Forms of sporulation with more than four merozoites are very rarely to be seen in the peripheral blood, but in successful cultures forms of schizogony with sixteen and more merozoites are seen. In this way it is possible to keep the culture alive up to the fifth, or even to the sixth day, but already after the second day some degenerated forms appear which become more frequent after the third day. Nevertheless, I succeeded in mortally infecting a dog by an intravenous injection in the jugular vein taken from a three days old sub-culture, which in turn was taken from a two days old culture. In one instance I also succeeded in getting sub-cultures from a four days old culture. Even a four days old sub-culture tainted by bacteria showed itself virulent the other day by intravenous injection. If the growth of bacteria in a culture has lasted more than twenty-four hours, however, a quick dying-off of the parasites can be observed, just like in the cultures of malarial parasites. The contamination of the culture by blastomycetes does not damage the parasites so quickly. As soon as degeneration takes place, the piroplasmata lose their typical pear-shape, turn roundish, the plasma body becomes of a darker colour, and the colouring of the chromatin ceases. At the same time some parts of the plasma body may come off in the form of small particles or little threads; later the degenerated parasites are ingested by leucocytes.

I shall report about serological, diagnostical, &c., experiments elsewhere.

PETROLEUM INTERNALLY.

By W. TEN HOOPEN.

Groningen.

In cows which suffer from chronic lung trouble treatment was very gratifying by use of 15 to 30 grm. of petroleum given once daily in a wine bottleful of milk. In animals treated for a few days coughing ceased, condition improved, and in the course of a few weeks they were restored to perfect health. Some advanced cases were cured by this therapy. The affected animals before treatment showed frequent dry cough, great emaciation, sparse milk supply and diminished appetite.

Translations.

TAXUS POISONING.

BY PROFESSOR B. BANG, M.D.

AN eight-months-old calf was found dead on the morning of January 4 by its owner, Grut Hansen, of Kolle-Kolle. *Post-mortem* by the veterinary surgeon showed an inflamed rumen. On the same evening at seven o'clock a six-months-old calf died, and a few hours later two of the other calves stumbled headlong and fell, but got up again, however. In the afternoon the calves were dull and blown up and ate less than usual. A few days later the four remaining calves recovered. The second calf that died was examined *post mortem* on January 5. The rumen was filled with food. This was mixed with a quantity of taxus leaves, partly isolated and partly aggregated, which were easily recognized by their dark-green, flat needle-shaped appearance. The mucosa of the rumen was intensely inflamed; the epithelium had become detached, or was easily detachable. No exudation into the wall. Nothing abnormal in the other stomachs or intestine and spleen natural.

Liver and kidneys full of blood. Punctiform hæmorrhages in the thymus gland, the glands of the neck, as well as on the bronchial mucosa, and on the external surface of the heart; some blood in the bronchi. In the heart rather loose dark coagula. The brain was divided, but its tissues were not specially inflamed.

The calves had been put into an enclosure during the day where some clippings from the garden shrubs and trees had been placed on January 2. Here were found clippings of sorrel, laburnum, taxus, box, cypress, and jasmine, and the owner had already suspected that poisoning had resulted from one of these plants. He had taken the temperature of the calves at eight o'clock in the evening, and found them from 38·4—39·2° C. The author had had previous experience of taxus poisoning in Denmark.

In the year 1892 four heifers out in a meadow died suddenly at Lolland. They were only ill a few minutes, or perhaps a quarter of an hour. A suspicion of anthrax arose. On *post-mortem* yew leaves and branches were found in the rumen, and it was shown that the heifers had broken loose shortly before their illness and had nibbled at some yew trees that were accessible.

On March 28, 1908, Veterinary-Surgeon Tauber relates a case where two foals let loose in the evening did not return to their stalls. On the next morning they were found quite comfortably housed on a neighbouring farm. At half-past eight they were brought into the stable and were lively and ate well. At half-past nine they were found dead in their stalls. Apart from "indication of a serious infiltration along the colic mesentery" in one foal, and considerable hæmorrhagic changes in some of the lymph glands of the other foal, nothing abnormal was found. In the contents of the stomach there were yew leaves and twigs. On

inquiry by the veterinary surgeon on the next day it was found that the foals had eaten of the yew leaves in a garden.

Tauber relates a case also where a six-year-old cart-horse put under a yew tree for ten minutes ate the leaves and branches and was dead two hours afterwards.

Taxus poisoning has been recognized for over 100 years, and Erik Viborg mentions cases that occurred in 1797. Different views, however, prevail as to the injurious effects of yew leaves. Viborg states that in Hessen yew leaves are used as a winter food, but the peasants recognize the danger of them if they are not given gradually to stock. They are never given without admixture with other foods. Experiments by Viborg on horses, cattle, sheep, goats, swine, dogs, cats, hens, geese and ducks show that the effects of taxus depend on whether it is taken on an empty stomach or mixed with oats. Single horses succumbed after taking one pound of fresh leaves. Swine are most susceptible. Flesh eaters, ducks and geese do not die, as they vomit up the leaves; the remaining animals die after a proportionately large dose (for swine about eighty grammes, for hens about forty grammes), showing attempts at vomiting, dulness, dizziness and convulsions. Viborg's experiments caused a circular to be issued in Denmark calling attention to the danger of yew to most animals; but experience had shown that cows might become accustomed to it if given with other food.—*Deutsche tierärztl. Woch.*

ON THE CAUSE AND SYMPTOMS OF SYMPTOMATIC URTICARIA OF THE OX.

By J. NEUENSCHWANDER.

Veterinary-Surgeon in Grüenmatt.

URTICARIA of cattle is a quite frequent ailment occurring in my practice, being well known to the owners of animals under the name of "hell-fire." It presents itself in an alarming form, although, as a rule, harmless enough. It shows itself generally by oedematous swellings in the head, dewlap, rectum and perinæum, and eruptions on the shoulders and back. Lately a case has occurred with me which is of special interest, as well from the point of view of the cause as also on account of the little known symptoms.

A valuable cow belonging to J. W., in F., was announced to me by telephone as ill, with the remark that she had a foreign body in her œsophagus. Subsequent examination showed that the animal's tongue was stretched out of her mouth; there was great distress in breathing. At first I suspected anthrax, but since the temperature was 38.9 and the pulse 66 this diagnosis was given up. On closer examination of the mouth the ligament of the tongue, the mucous membrane of the mouth and pharynx were highly swollen oedematously, a circumstance little noted until now. Zipperlen describes a case where the conjunctivæ, the rectal and vaginal mucosæ were involved, which

observations were confirmed by Schindelka. Such severe swelling of the mucosa of the mouth and pharynx has never occurred with me before, nor do I find any previous records of such, consequently at first I did not diagnose urticaria, but ascribed the case to an insect sting (bee or wasp) and ordered cautious administration of draughts of milk. The owner advised me that the animal had been left unmilked. As I have often noticed urticaria in animals being dried and generally on the second day after not milking, I now immediately suspected this complaint, and subjected the animal to a thorough examination which showed (1) that the dewlap was as hard as a board; (2) that elevations as big as a pigeon's egg had formed on the shoulders; (3) rectum slightly swollen. Now my diagnosis was urticaria. Therapy: immediate milking out, letting out to graze at will. On the next day all the elevations, as well as the œdematous swelling, had gone and the patient seemed quite right again.

My view as to the cause is to be found in the sudden interruption of lactation, on account of which a certain toxin formed in the udder, which by resorption had an injurious influence on the circulation of the blood. I support this view by the fact that this disease often occurs in cows left unmilked in the autumn, although no change of food has been given; also even in grass-fed cattle. At times I have noticed certain animal families whose members, on interruption of lactation, always suffered from urticaria, and also possessed a certain predisposition which was transmitted to future generations.—*Schweizer Archiv für Tierheilkunde*.

Review.

The Common Colics of the Horse. By H. Caulton Reeks, F.R.C.V.S. Third Edition, pp. 369, with 32 figures in the text. Price 6s. net. Published by Baillière, Tindall and Cox, London.

When Mr. Reeks made a special study of the treatment of colic in horses he commenced a task of which every veterinarian, engaged in private practice, knows the importance and magnitude; for "colic," although one of the commonest of everyday conditions which the practitioner meets with, is also one of the most dreaded and serious.

"Colic" may signify almost anything, in that the term is applied to a slight attack of abdominal pain and it is also applied to the acute agony caused by the presence of a stone or a twist of the bowel. To classify correctly and accurately the colics of the horse needs a lifelong experience, and those who study Mr. Reeks's book on the subject must at once become keenly interested and acknowledge that the profession owes him a deep debt of gratitude.

The fact that the book has already run through three editions and two reprints since 1902 is sufficient proof that it was much needed and has been much appreciated.

The subject is treated thoroughly and in detail right from the start, a most interesting and clever chapter being devoted to the variations in symptoms and treatment in the young and unbroken colt as compared with the older working animal; and it is easy to see throughout that the whole of the work emanates from the brain of a "practical" man, who has also the advantage of the possession of sufficient enthusiasm to enable him to consider in a sensible way anything which may come before his notice and to discard all impossible and useless theories.

Always an advocate of the stimulus treatment of colic, it was Mr. Reeks who first drew attention to the abuse of sedatives, and who, by his writings, has practically revolutionized ideas in this direction—to the benefit, undoubtedly, of equine patients in every part of the world.

ERRATUM.

IN THE VETERINARY JOURNAL for March it was stated, when writing of Mr. Prentice, M.R.C.V.S., the Chief Veterinary Officer of the Department of Agriculture, that he was a graduate of the "Irish" Veterinary College. This should have read the "Dick" Veterinary College.

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THE LATE PROFESSOR ANDREW SMITH, F.R.C.V.S.

Principal and Founder of the Ontario Veterinary School (now affiliated with the
Toronto University), Canada.

THE VETERINARY JOURNAL

MAY, 1914.

THE LATE PROFESSOR ANDREW SMITH, F.R.C.V.S.

AN instance of the importance attached to the teaching of veterinary science in Canada is shown by the fact that the Ontario Veterinary College was, a few years ago, attached to the University of Toronto and a Faculty of Veterinary Science established.

The original College owes its start, and, indeed, its popularity (for the Ontario graduates number more than those of any other Canadian or American College), to the energy and capable administration of the late Professor Andrew Smith, who pioneered veterinary science in Canada from a very humble commencement to its present secure position.

Born in the parish of Dalrymple, Ayrshire, Scotland, the only son of the late James Smith, a well-known farmer in that district, he obtained his early education at the Dalrymple Public School, and then went to Edinburgh Veterinary College, where he graduated with the highest honours in 1861.

In 1861 steps were taken to establish a veterinary course in Toronto in connection with the late Professor George Buckland's agricultural class in the University of Toronto. The late Professor Dick, of Edinburgh, recommended Mr. Smith for the position, and he came to Canada and began a course of teaching in 1862, from which has developed the Ontario Veterinary College.

Mr. Smith was a member of the Senate of Toronto University and a Director of the Industrial Exhibition, and for two years he was President of the Exhibition. His services as a judge at horse shows were in demand all over the Continent, and he was also Master of the Toronto Hunt for ten years. For several years he was Chairman of the Executive Committee of the Ontario Jockey Club, and owned many valuable and successful racehorses. His name is, and always will be, a household word in Canada wherever veterinary science is discussed.

Editorial.

BIER'S TREATMENT IN VETERINARY PRACTICE.

AN original paper on the above subject, which appears in this month's issue, is worth bringing to the especial notice of our readers, as the subject is one of very great importance from a clinical standpoint and is dealt with in a very lucid manner by the writer.

The methods of application are so simple that they can be carried out by anybody of average intelligence under even the most superficial veterinary supervision, with a minimum of expense in the cost of appliances and apparatus.

If an editorial hint might be put forward it is that our readers shall give the method an impartial and open-minded trial in a number of selected cases—say, at least ten—and report the results in our columns. The results of such in, say, ten busy practices would settle the question for good and all as a practical and reasonable course of treatment in veterinary patients. In particular is the hint worth following up in regard to cases of laminitis.

HORSE ABATTOIRS FOR ENGLAND.

THE value of horse flesh for human food is not appreciated in England and very many people would turn up their eyes in pious horror at the idea, although at the same time reports in the public press show almost every day the existence of cruelties, in the shape of working unfit animals, which in Holland would certainly not be allowed.

The horse flesh trade of Holland and Belgium is largely dependent for its supply upon Great Britain, and for this reason it is necessary that our Government shall exercise veterinary supervision over the animals sent to meet the demand.

During the past few years veterinary inspectors have been appointed at each port of embarkation, and even so recently as a few months ago their hands were strengthened in regard to the powers allotted to them to reject or pass the animals brought before them for exportation. There is yet, however, amongst a certain section of the general public a strong feeling that more might be done; and although there is no absolute desire to abolish what is quite a legitimate trade, there is a strong sentimental feeling that the people of England, whose work on the humane treatment of animals is so well known all over the world, should see that the final scene was played on *this* side and not left to the tender mercies of those who speak another language, and are not always imbued with the same fine feelings.

For this purpose a scheme is now on foot, with strong financial promise of support, to erect abattoirs in England where horses may be killed humanely and the flesh properly dressed, and afterwards inspected by qualified meat inspectors before being sent abroad. If, as seems likely, the scheme is carried out, the trade abroad in decrepit horses will inevitably cease, although it will have to rest with us more than ever to see that in conveyance to the places of slaughter no cruelty is inflicted. It is only by veterinary inspection and veterinary certificates that such can be prevented, and by making those in charge of the transport arrangements legally responsible, the end desired must inevitably be attained.

General Articles.

BIER'S HYPERÆMIA TREATMENT IN VETERINARY PRACTICE.

BY CHARLES HARTLEY, JUN., F.R.C.V.S.

Lincoln.

My attention was first drawn to Bier's passive, or venous congestion, treatment, by seeing its marvellously successful application in a case of septic infection of a wounded finger incurred while making an autopsy.

This led me to attempt its use in veterinary practice, and whilst it has a more limited field there than in human surgery, I am convinced that it enables us to treat many pathological conditions more successfully, easily, and humanely, than can be done by any other method.

Professor Von Bier employs two kinds of hyperæmia, which he distinguishes as active and passive.

The active hyperæmia essentially consists of the dilatation of the arterial vessels, which induces an increased supply of red blood to the part, and for this purpose he employs a direct current of heated air. I do not intend to discuss this method here, though it is interesting to note that some years ago experiments on horses and dogs, as well as with human patients, with the Dowsing system of radiant heat were made with a considerable measure of success. With this method temperatures up to 280° F. were endured without discomfort, and the hyperæmia was found useful in cases of muscular rheumatism, tendon sprains, and disturbances of the circulation.

Passive hyperæmia is the induction of a venous congestion by partially stopping the outflow of blood from the tissues.

The treatment of disease by hyperæmia is one of the oldest methods known, cupping glasses, irritants, rubefacients, blisters, and the actual cautery having been used for this purpose from time immemorial.

It is Nature's own cure for injury or disease by producing inflammation in the part concerned. If the reinforced blood-stream is able to successfully deal with the trouble the inflammation subsides; or, if unsuccessful, the tissue elements are

destroyed and necrosis results. Bier states that the inflammatory processes appearing in a diseased part, of which the increased supply of blood is the chief, are not harmful, but are the body's own attempt to remove the trouble. He reasons that the old-established antiphlogistic treatment is wrong, and that one should encourage a moderate degree of inflammation, and that there can be no healing of a tissue unless it is in a hyperæmic condition.

I believe that Bier was the first to make use of a pure induced hyperæmia, and his methods have been largely followed both here and on the Continent with great success. In human practice passive hyperæmia is used for tuberculosis of the joints, acute inflammations and suppurations of the extremities, such as acute osteomyelitis, lymphangitis, phlegmon of tendon sheaths, acutely inflamed joints, erysipelas, infected wounds, diphtheria, coryza, inflammatory conditions of the ear, carbuncles, furuncle, mastitis, &c.

There are two methods of producing passive hyperæmia—in the extremities by means of an elastic bandage or rubber ring, which is placed as far above the diseased area as is possible, and then sufficiently tightened to partially obstruct the venous circulation without interfering with the arterial flow. In parts where the use of a bandage is impossible the hyperæmia is caused by suction with a cupping glass made to fit the particular part, but it is doubtful whether this type of hyperæmia is always purely venous. The literature on its application to veterinary practice is very scanty, and it appears that the difficulties of its application are very great. Wolfer, of Rheda, reports two successes attained in the treatment of phlegmonous swellings in the horse and ox, but condemns it as unsuitable for mastitis in cattle. This is peculiar, as it is claimed to be the ideal treatment for this disease in the human female.

The technique of the application of the compression bandage is fairly easily learned, though we have to judge entirely by the objective symptoms in our patients. The most important point is that the bandage must not cause pain; indeed, if any pain be present it should be quickly relieved. This indication is of the greatest possible value, as if the pain be increased—and it very quickly will be if the bandage be wrongly applied—one knows at once that the pressure is too great. On the other hand, if the

pain be not decreased after several hours' application the bandage must be drawn tighter. I do this until it appears to become a little uncomfortable, and then ease it a trifle from that. A useful point to note is that the bandage must not be tight enough to interfere with the voluntary movement of the limbs. The extremity should remain as warm as, or even warmer than, the corresponding one of the opposite side, and the pulse below the bandage should remain clearly perceptible, provided it was possible to record it before the application of the constrictor.

In acute inflammations of the horse's foot the pulse is often perceptible at the plantar artery and then affords a perfect guide. The colour of the skin in light-coloured dogs and white-heeled horses may be some guide, but the warmth of the limb and analgesia are the best helps to me. I should strongly advise anyone before applying this treatment to make first a few experiments upon himself, and he will very quickly grasp the degree of constriction required. I have had surprisingly little trouble in teaching owners and grooms to apply the bandage themselves when once they have had the idea carefully explained to them, and I have not so far had the slightest mishap with the treatment, the only trouble experienced being a tendency to bandage too loosely at first; but I regard this as a fault on the right side, and one which can be quickly remedied.

A few feet of elastic cotton net bandage for horses' limbs and ordinary rubber rings (obtainable at a stationer's) for small animals are most effectual, always padding underneath with plenty of cotton-wool. At first I dispensed with the wool on the horse, but I found that it rendered the process easier to carry out, more successful, and removed all danger of chafing from the bandage.

It has been recommended to bandage obliquely round the limb, not placing the folds directly upon one another, but I find this more difficult in application, and have not myself observed better results from it. An essential factor for success is that the constrictor shall be as far from the diseased area as possible, and no success could be achieved with it applied below the knee or hock. I now apply it round the forearm and the tibia as high as possible to avoid undue pressure on the Achilles tendon. To prevent slipping it is a good plan to fasten a layer of cotton-wool to the hair with some adhesive, so giving the bandage a better bite. In small animals it may be applied above the elbow or the

hock, a ring above the stifle not being successful. It is advisable to fasten the end with strong safety pins as a tape is very apt to slip round, and there is also a danger of tying too tightly.

Dogs appear to tolerate an elastic bandage an inch wide round the neck without showing any signs of discomfort, and though I have not at present any reliable experience, it may be of use in otorrhœa.

The result of the compression bandage is to cause a great slowing and widening of the blood current in the part peripheral to it, thereby producing what one may describe as an artificial inflammation. The partial damming of the blood-stream causes a heightened pressure in the vessels with outpouring of the serum into the tissues and materially helps the emigration of leucocytes. These are present in increased numbers, partly because of the increased quantity of the blood, and partly because they tend to become stationary in the retarded current.

Hyperæmia lessens pain, checks infection, destroys bacteria, and favours absorption and regeneration.

The diminution of pain is one of the most notable effects of passive congestion, and also one of the most useful. The speedy relief of suffering is obviously our duty from a moral point of view, though it is sometimes apt to be overlooked by veterinarians; but, apart from that, it is most conducive to a speedy cure.

Dogs and cats are not so prone to interfere with wounds or injuries if relieved of pain; and in severe foot cases in horses the relief afforded obviates the use of slings, and prevents the appearance of general symptoms due to exhaustion and loss of appetite.

Restive and nervous animals become easier to approach and to dress than before, and I attribute a good deal of the success of hyperæmic methods in animals to this effect. It may be explained by the fact that the outflow of serum lessens the tension in the vessels and washes away diseased products which irritate the nerve terminals, but more probably it is through the serous infiltration of the tissues, which diminishes the sensitiveness of the nerves, as does the infiltration method of anæsthesia of Schleich.

BACTERICIDAL EFFECT OF HYPERÆMIA.

There is no doubt that congestion hyperæmia has a destructive, or, at least, an attenuating, effect upon bacteria. This has been

proved experimentally, and it has also been shown that the serum from a congested inflamed extremity has greater bactericidal powers than that taken from a normal limb which has been rendered hyperæmic. But more convincing than experiment is the fact that in practice, after the application of the elastic bandage, badly infected wounds quickly become sterile, pus disappears, and hot abscesses if evacuated and properly drained clear up with wonderful rapidity. Many theories have been advanced to explain this action, one being that it is a simple washing away of the bacteria and their products by the increased amount of serum. This doubtless helps, especially in the case of widely open superficial wounds, but it is impossible to explain all cases in this way. Hamburger considers it due to the fact that the congestion hyperæmia makes the blood richer in carbonic acid, which itself is destructive to bacteria, and which renders the serum richer in alkali by its action on the red corpuscles. Congestion hyperæmia, by slowing and widening the blood-stream, causes an increased number of phagocytes to collect in the inflamed area and renders their migration from the vessels easy. They are able to attack the bacteria in great force, and are materially helped by the serum, which contains the specific antibodies elaborated by the system required to deal with the bacteria and render them easy of destruction. It is perhaps better at present to look upon all these actions as helping one another, and not pin our faith to one particular theory to explain the bactericidal action of venous hyperæmia. It has long been known that blood serum by itself has a deterrent action on bacteria and is stimulating to the tissues. Horse serum has been used in human practice with success to induce indolent wounds and ulcers to heal.

The congestion œdema appears to have a remarkably solvent effect on new inflammatory tissue with the exception of epithelium, so that the cicatrix is softer and more flexible than usual, while the exuberant granulations disappear. In one or two cases I noticed an increase in the granulations to a large degree on the first application of the bandage, but after a time this disappeared, and the wound drew up to a perfectly flat scar. A point in connection with this is the advisability of continuing the treatment for some little time after an apparent cure has been effected. If this be done all the diseased tissues will be removed, and in many cases considerable deformity avoided.

A physiological instance of the effect of hyperæmia on scar tissue may be seen in the way in which cicatrices in the vagina of a cow caused by a previous difficult parturition soften and relax at the time of the next calving.

Congestion hyperæmia stimulates the lymphatic system, causing an increased current of lymph which helps to carry away the *débris* from the diseased tissues, and so helps to prevent the formation of an abscess; or, if one is already present, removes its walls after the pus has been evacuated, which must be done thoroughly and promptly if success is to be attained.

Bier describes a rare condition in which the lymph-stream is obstructed, but I have not heard of this being met with in our patients.

During the periods when the bandage is removed the absorption of fluids by the blood-stream is materially increased, and the part under treatment quickly returns to its normal size.

CLINICAL CASES.

Case 1.—A yellow-coloured, full-grown neuter cat was brought to the infirmary on April 18, 1913, with a lacerated and infected wound on the front of the left metatarsus. The history obtainable was that the cat had sustained the injury three days before, but the exact cause was not known. The wound extended almost round the sides of the foot, only about a finger breadth of sound tissue remaining. The deepest part was in the centre, the extensor tendons of the two middle digits were severed and the bone exposed. The wound was thoroughly cleansed and trimmed and treated with antiseptic dressings in the ordinary way, but the cat was in great pain and refused to allow any dressings to remain in place, constantly licking the wound. For about a week treatment with various antiseptic dressings was tried, but the wound grew steadily worse and began to smell badly.

Considering ordinary measures to be useless permission was asked to amputate, but this the owner absolutely refused. As a last resource I adopted Bier's treatment, placing a rubber ring well padded with wool round the leg above the hock, leaving it on for four hours and off for four hours alternately. On the second day the cat improved in spirits, regained appetite, and ceased to lick the wound. On the third day granulations appeared at the edges, and slowly spread over the surface of the

wound. After the first week the time of bandaging was gradually increased to twelve hours on and twelve hours off alternately. On May 14 the cat was discharged as cured, but was brought back on May 16, the wound having reopened. The owner informed me that the patient had jumped through a half-opened window, catching his leg in the sash. The elastic bandage was again applied, and the cat discharged finally on May 18. I saw the patient two months later, when the scar was completely covered by hair and was hardly noticeable to the touch. The leg is of the normal size, but the two middle digits are slightly dropped. This, of course, was to be expected, as quite $\frac{1}{8}$ in. of each tendon had been destroyed. During the time the hyperæmic treatment was adopted the wound was merely wiped occasionally with a little boric wool to remove accumulated discharge. I am now of opinion that if the ring had been applied for longer periods from the commencement of the treatment healing would have been materially hastened. The case shows well the soothing effect of the hyperæmia, and it is this which made a cure a possibility. The granulations at first were very prominent and I feared a permanently thickened limb as the result, but they were gradually absorbed. The œdema resulting from the pressure of the ring was considerable, but it had always disappeared before the time of the next application. The discharge from the wound was at first thick, purulent, and foetid, being greyish in colour; but it gradually lost these characteristics, became free from odour, clear and serous. Only once was the ring applied too tightly, but no ill-effect resulted, though the foot was distinctly cold when the ring was removed.

Case 2.—An aged cart mare. When first seen, on August 1, 1912, this mare was very lame on the off fore-foot, with a small wound discharging pus on the outside of the coronet. The history obtained was that she had been gradually getting worse for about a week. The shoe was removed and it was found that there was a separation of the wall from the outside heel nearly to the toe, full of pus, much of the sole being underrun. The separated horn of the sole was removed, drainage provided, and poultices and antiseptic fomentations provided. The foot became worse, four sinuses opening at the coronet, and as the animal was of low value the owner would not consent to a radical operation with its attendant trouble and expense. The animal refused to

put the foot to the ground and was rapidly losing condition. A light shoe was put on and the foot was washed in weak lysol twice a day and wrapped up in sacking after being well packed with tow. The elastic bandage was applied for four hours twice a day. Three days later, though little improvement could be noticed in the foot, the mare placed it firmly on the ground, and had regained her appetite. Owing to the question of expense I only saw the case occasionally, but the improvement was steady, and in about six weeks the mare was put to work. There was a large outgrowth of horn at the coronet, but this gradually grew out, and to-day the foot is normal in shape.

This case when first treated was rapidly becoming a serious quittor which under ordinary circumstances would have been impossible to treat, as the owner refused to give much time to it and I could not pay frequent visits. The bandage caused very little cedema in the limb, which perhaps may be explained by the thickness of the skin in a cart-horse, though there was a greatly increased discharge from the wound at first. This gradually became thinner and less purulent as healing progressed.

The analgesic effect of the venous hyperæmia was well seen in the two preceding cases, where the engorgement of the diseased areas with blood stimulated the tissues to deal with the septic invasion and also to remove the accumulated results of the inflammatory process. In both cases the destructive action of the organisms was at once arrested and healing allowed to commence. I attribute some measure of the success attained to the fact that the comparative freedom from pain allowed the animals to make more use of their limbs than is usual, so preventing the tissues from becoming unhealthy through inaction.

Case 3.—An aged van mare, brought to the infirmary on March 26, 1913. She showed acute lameness of the near fore-leg from a suppurating corn which had been neglected. The feet were flat with weak heels. The inside of the near fore-heel was swollen and very tender and there was much suppuration. The foot was pared out, all underrun horn removed, and a bar shoe fitted. Hot poultices and antiseptic irrigations were ordered. Under this treatment the lameness decreased and the mare was sent to work on April 13. On May 23 she was brought back more lame than at first. The owner had turned her out to grass and had paid no attention to the shoe, which had been left on

and had bruised the heel afresh. On the advice of a "friend" he had applied a cowdung poultice, and there was now a sinus discharging pus in two places at the coronet with much swelling and tumefaction. Free drainage was effected, the sinus being well irrigated with weak chinosol and the foot wrapped in wool and tow and placed in sacking to keep it as clean as possible. An elastic bandage, 3 in. wide, was placed above the knee for twelve hours on and off alternately. Five days later the lameness was not noticeable at a walking pace, the swelling of the coronet was subsiding, and the discharge lessened. Against instructions the animal was worked, with a recurrence of the acute symptoms, but Bier treatment again afforded relief, and the use of the bandage was continued until the end of June. The mare is now working satisfactorily and there is no sign of recurrence, though her heel is deformed and the lateral cartilage is ossifying. I am strongly of opinion that if the correct treatment had been persevered with from the first the cure would have been entirely successful. However, the animal has been made quite useful at comparatively small expense and was able to work much sooner than one would have expected. This case is very similar to the preceding one, but I have described it at length for its economic aspect. The owner was a very poor man, who could not have paid for a long or expensive treatment and to whom the wage-earning power of his animal is a very serious item. He quickly learned to apply the bandage himself and had not the slightest mishap with it.

Case 4.—An aged carriage horse. This patient had large capped hocks of many years' standing. The near one was bruised afresh on April 12, 1913, causing lameness and great swelling of the hock and tendons. On April 13 the bursa was opened and a large amount of pus evacuated. The cavity was irrigated twice daily with chinosol, $\frac{1}{2}$ gr. to 1 oz., but the discharge continued copiously and the swelling of the leg did not diminish. On April 16 the elastic bandage was applied for twelve hours on and off alternately. The inflammation of the tendons at once began to subside and the pus became less copious and thinner. It gradually lessened, the wound healed, and the animal went to light work on April 22. This case well illustrates the bactericidal effect of venous congestion, as it rendered possible the easy and permanent healing of an infected bursa which in the ordinary way proves too often a most difficult thing to subdue.

Case 5.—A three-year-old bay mare, very lame on the off hind-leg, which was much swollen from the hock downward. The lameness had occurred whilst the animal was at grass and had been present for about a week. A definite diagnosis could not be arrived at, but I was of opinion that there was a severe injury in the neighbourhood of the fetlock joint, probably to the upper end of the os suffraginis. Hot applications of china clay paste were applied, but the lameness persisted and four days later the fetlock joint burst on its postero-internal face, synovia flowing freely. The hot applications were discontinued, the wound being dusted with antiseptic powder, and an elastic bandage applied above the hock for ten to twelve hours a day. Under this treatment the discharge of synovia ceased in two days and the lameness decreased sufficiently to allow the animal to walk a little. Bier's treatment was continued for a fortnight, but without any further improvement. I cite this case as it is the only open joint which I have treated, and the bandage appeared to expedite the healing process remarkably.

Case 6.—A three-year-old brown Hackney mare. We were first called to attend her for influenza, from which she made a good and quick recovery. Her owner very unwisely gave her a too liberal diet of oats, beans and wheat, with the result that a severe attack of laminitis in all four feet supervened. The pain was intense and the animal, a very highly strung, nervous mare, bore it very badly. It was impossible to apply poultices to the feet, or, indeed, to interfere with them at all, and she obstinately refused to lie down. All food was rejected and she fought desperately at any attempt to drench her. Her condition became pitiable, and it was with difficulty that the owner was prevented from destroying her. Recalling how the Bier treatment had relieved pain in other cases I, as an experiment, applied elastic bandages to both forelegs, and, rather to my surprise, in less than six hours she quietly lay down and slept for some time, afterwards taking a little food. Recovery from then was steady, though very slow. The bandages were applied for four hours at a time and only if the mare was on her feet. Considering the severity of the case the deformation of the feet is very slight. I regret to say that I have not yet had a similar case on which to try the treatment, but it appears to me well worth a very thorough trial for laminitis.

An improvement in technique would be to keep up the venous congestion for much longer alternate periods and to continue it during and after convalescence for a longer time in order to get the solvent and absorbent effects upon the inflammatory products left in the foot. At first sight any treatment causing an exudate would appear to be wrong in laminitis, but Bier strongly recommends passive congestion in acute inflammations of the human, perhaps the condition most analogous being the acute orchitis of gonorrhœa, in which there is a very vascular tissue enclosed in an inelastic case. The application of a moderate tourniquet to the spermatic cord has most successful results in this condition. In this type of case the bandage should be applied early and for as long periods as possible. A practical point which reduces the difficulty of application is that in laminitis the pulse can usually be felt at the plantar artery. This is an invaluable guide as to the tightness of the bandage, for it is easy to realize that any interference with nutrition would undoubtedly be attended by grave consequences. Although this is not a pure case of treatment by passive congestion (the animal receiving all ordinary general treatment at the same time), I certainly believe that a cure was only made possible by its use and that it may prove to be of the greatest assistance in this painful and unsatisfactory disease.

The above cases are a few in which I have had the opportunity to give venous hyperæmia a trial, but with further experience to guide us it should be applicable to many pathological conditions met with in veterinary practice. Professor Craig has published an account of the successful treatment of hygroma. Messrs. Sampson, Pillers and Irving report success with injuries to the foot, but the literature on the subject in England appears to be scanty.

Lemire and Ducrotoy have used it with success in phlebitis (in which it is contra-indicated in human practice), traumatic arthritis, injuries and wounds of the extremities, lymphangitis and strains of the suspensory ligament and flexor tendons. In the last two conditions my experience so far is unfavourable, and I conclude that to be successful treatment must be commenced very early. In periostitis of the cannon bones from blows it is excellent, and though I have had no opportunity for trial I should suggest the use of Bier's treatment for sore shins or acute splint lameness.

In all wounds or bruises of the extremities it is well worth a trial, but to gain good results the bandage must be applied as far as possible from the diseased area, and pus, if any be present, must be promptly evacuated and good drainage provided. Failure to effect this has been the cause of several failures in my hands, notably one case of infection of the sheath of the perforatus tendon in a hunter.

Venous congestion exercises no preventive effect in cases of interdigital abscess in dogs, but it is useful to allay the acute pain often met with during the formation of the abscess. A rubber ring above the elbow or hock will be found useful in cases of injury to the nail or pad of dogs.

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WILD GAME AS A RESERVOIR FOR HUMAN TRYPANOSOMES.

AN ANALYSIS OF THE AVAILABLE EVIDENCE FROM THE NORTHERN
SHORES OF LAKE VICTORIA NYANZA.

By H. LYNTHURST DUKE, M.D., D.T.M. & H.CAMB.

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THE question whether the wild game of the sleeping sickness areas of Africa are acting as reservoirs for the human trypanosomes, *Trypanosoma rhodesiense* and *T. gambiense*, has recently attained great importance. Among the investigators engaged in the biological problems connected with sleeping sickness there are two distinct opinions prevalent. On the one hand some observers—foremost among them the Germans of Lake Tanganyika—are strongly of the opinion that these game trypanosomes, however similar they may seem to the human parasite, are nevertheless non-pathogenic to man; others, including the Royal Society's Commissioners in Nyasaland, and Kinghorn and Yorke, consider

that certain of the trypanosomes recovered from the local game are identical with *T. rhodesiense* of man.

The special aspect of this question which will receive attention here is the part played by the game in the fly area of the northern shores of the Victoria Lake. As is well known, a terrible epidemic of sleeping sickness devastated this part of Uganda Protectorate in the years 1899-1909. The disease was presumably introduced by caravan porters from the Congo, where trypanosomiasis has long been known to the natives. In 1908-9 the native population of the lake shore of the mainland and of the neighbouring islands was removed inland, away from the fly. Since this measure the disease has practically died out in this part of the Protectorate. In spite, however, of the removal of the natives from contact with the wild lake shore *Glossina palpalis*, a certain proportion of these flies are still (1912) capable of infecting monkeys with a trypanosome. The morphology and general behaviour of this organism are indistinguishable from those of *T. gambiense*.

Again, in September, 1911, an exactly similar trypanosome was obtained from the blood of two situtunga antelopes shot on Damba Island, about nine miles from the mainland.* The point to be decided is: Are these "wild fly" and "situtunga" trypanosomes descendants of the *T. gambiense* which caused the recent epidemic, or are they merely parasites of the antelope, and not capable of surviving in a human host? Unfortunately, the decisive experiment of inoculating the organisms in question into man is not feasible in Uganda. There are no local volunteers, and the ethical objections to experiments, however painless, on condemned criminals are insurmountable. All that can be done is to review the whole available evidence in the light of common sense, and to try and arrive at a logical conclusion.

For convenience, the trypanosome obtained from Damba situtunga will be referred to as the "Damba trypanosome." The organism pathogenic to monkeys and derived from wild flies will be called the "wild fly trypanosome." I hope in the course of this brief review to establish the fact that these two trypanosomes are identical; and that both are the descendants, doubtless somewhat modified, of the parasite which caused the recent epidemic.

* *Proc. Roy. Soc.*, B, 85.

The points demanding attention will be considered in the form of a series of questions and answers.

(A) *Is there any reason to doubt the identity of the "Damba" trypanosome and the "wild fly" trypanosome?*

I have shown that the morphology and general reactions of these two strains of trypanosomes make it impossible to doubt their identity.* The answer to this important question is accordingly in the negative.

(B) *Is there any evidence that the trypanosome of the fly on the mainland and island coasts of Northern Lake Victoria Nyanza is derived from antelope, rather than from hippos, reptiles, or birds?*

(1) The "Damba trypanosome" was obtained in monkeys by direct injection of situtunga blood.

(2) Blood of a considerable number of hippos, birds, and reptiles has been injected into susceptible animals without any trypanosome being discovered.

(3) On islands where there are no buck but plenty of hippos, reptiles, and birds the tsetse are incapable of infecting clean monkeys or goats.

(4) The closer the relations between antelope and tsetse, the greater the percentage of infective flies.

As far as there is any evidence, therefore, it answers this question in the affirmative.

(C) *Is there any evidence that the trypanosome of the fly is derived from truant natives?*

In spite of the regulations to the contrary there has been evidence from time to time that a few individuals have visited parts of the prohibited area. Some of these have been arrested; others are, perhaps, still at large. Could these natives account for the persistence of infected fly?

The following considerations make this explanation inadequate:—

(1) There are *very* few such natives.

(2) They do not visit the strips of shore on which the experimental flies are caught, for fear of being seen and arrested by the laboratory employees, who are known to visit these localities regularly in search of fly.

* *Proc. Roy. Soc., B*, 85.

(3) It is improbable that these truants are sick, as they have of necessity to lead a rough existence and to be constantly on the lookout against capture.

(4) The signs of recent native occupation are usually on the far side of islands, not on the mainland.

(5) On certain islands where definite signs of recent native occupation have been found—for example, huts, ashes, cooking utensils, &c.—and where there are no buck, the tsetse are non-infective. On these islands there could be practically no restriction to the movements of the truants—as regards fishing, &c.—owing to the distance from the mainland. Such islands are Nsadzi and Lwagi. The flies on the neighbouring island of Kome are infective, but here *situtunga* are common.

(6) Truant natives are notoriously addicted to night fishing in order to escape detection. *G. palpalis* is not active at night.

As regards the canoe men and fly boys employed at the laboratory to obtain flies and pupæ, they are kept under constant observation and have never shown any signs of sleeping sickness. Both blood inoculation into monkeys and the examination of fresh slides were employed at frequent intervals.

It is plain from the facts here given that antelope are probably the chief reservoir for the “wild fly” trypanosome.

(D) *Is there anything in the morphology and general behaviour of either of these lake shore trypanosomes which proves that they cannot be identified with T. gambiense?*

The morphology and animal reaction of these trypanosomes correspond closely with what is known of *T. gambiense*. They cause a more or less chronic disease in monkeys and rats, and are unaffected by human serum.

The data relating to the animal reactions of the human strain of trypanosome obtained from Uganda natives by the Royal Society's Commission at Entebbe show that the disease at the first inoculation was slightly more chronic. Thus white rats lived for three or four months, paralysis of the hind quarters being observed before death in some, but not all, experiments. In four uncomplicated monkey experiments, in which the animals were inoculated directly from human beings, the average duration of the disease was 184 days—the maximum being 250 days, the minimum 107 days. In four monkey experiments with the Damiba trypanosome the corresponding figures were 172, 207, and 144 days.

Four monkeys experimentally infected with the "wild fly" strain (1910-11) lived for an average of 114 days (maximum 147 days, minimum 85 days; this last monkey was an old emaciated animal at the commencement of the experiment, and cannot, therefore, be looked upon as a fair test of the pathogenicity of the trypanosome). A single monkey experimentally infected with wild fly trypanosomes at Entebbe, in 1904, lived 214 days.

A white rat subinoculated from a rat infected with human blood by the Entebbe Commission died in two months and a half without any parietic symptoms. The average duration of the disease in six white rats inoculated with the "Damba trypanosome" was 61 days (maximum 74 days, minimum 44—a very young animal). Similar figures were obtained with rats inoculated with the "wild fly" strain. It should be noted that the trypanosomes in these Mpumu rats had in each case undergone previous passage through monkeys. Some of the rats showed paralysis of the hind quarters before death, others did not.

It will thus be seen that the general behaviour of the Damba and "wild fly" trypanosomes in monkeys and rats resembles that of the *T. gambiense* obtained in 1903 directly from infected natives. Guinea-pigs were more refractory to the human than to the two recent lake shore strains. It must be remembered, however, in this connection that when originally tested by Bruce and his collaborators *T. pecorum* was non-inoculable into these animals, though it subsequently proved pathogenic. If such a modification can occur in a trypanosome in the course of a few months at the laboratory, much stress cannot be laid on this difference. For if the human trypanosome were excluded from the blood of man for several years, it might be expected to show a change in its behaviour towards other hosts.

The answer to this question appears to be, therefore, that not merely is there no good evidence to show that the Damba and fly trypanosome is not identical with *T. gambiense*, but that there is a certain amount of evidence to show that it is identical.

(E) *Are wild antelope of the species frequenting the lake shore inoculable with the human trypanosome? And if so, does the parasite persist for any length of time in their blood, or is it rapidly fatal?*

The experiments initiated by the 1908 Commission of the Royal Society at Mpumu show conclusively that clean bushbuck, reed-

buck, and waterbuck are inoculable with a strain of trypanosome derived from a native patient. Subsequently, at the same laboratory, a duiker and a situfunga were similarly infected.

I have shown* that the trypanosome was recoverable from one of the antelope twenty-two months after the original inoculation. Some of the antelope experimented upon ceased to give any evidence of infectivity long before this period had elapsed. Two others were proved to be still carrying the trypanosome fifteen months after inoculation. During the whole period of observation the animals showed excellent health, and on several occasions conceived and gave birth to healthy young at the laboratory.

There is some evidence to show that those animals which have ceased to give evidence of infectivity have acquired a resistance to reinoculation. On the other hand, this is no reason to suppose that the animal which gave a positive result after twenty-two months is not still infective.

The laboratory antelope, therefore, show that the wild lake shore game may act as a reservoir for the human parasite for at least twenty-two months, and during this time experiments have proved that they are relatively well adapted to infect fly with *T. gambiense*.

Given, therefore, a number of fly and antelope in a district, there is nothing to prevent the infection with *T. gambiense* being kept up indefinitely.

The answer to this question furnishes, therefore, indirect confirmation of the conclusions arrived at in the case of the preceding question.

(F) *Is the evidence available on the subject of the infectivity of the wild fly to the "wild fly" trypanosome such as would lead to the conclusion that this trypanosome is an antelope parasite, or that it is a descendant of the T. gambiense which caused the recent epidemic?*

The following table shows the available data on the subject of the fly infectivity.

These more or less random figures, taken at long intervals, have but little real statistical value. A number of uncontrollable factors affect their precision. Migration of the fly, the relatively

* *Proc. Roy. Soc.*, B, 85.

Period	Locality	NUMBER EMPLOYED		Number of infected flies	Percentage of infected flies		Remarks
		Fed	Put on				
May to July, 1903	Entebbe mainland	989-1,360*	—	3	0.30-0.22*		Natives present infected 1 in 3 or 4. No antelope
September to November, 1903	"	1,421	—	1	0.07		Natives removed. No antelope
June to September, 1904	"	2,209	—	0	0.00		No natives; no buck
November, 1908, to April, 1909	Mainland, Buka Bay	6,106	10,022	4	0.065	0.039	Antelope available
May to September, 1909	"	3,151	5,920	7	0.22	0.11	"
November, 1909, to February, 1910	"	9,878	—	4	0.04	—	"
March to June, 1910	"	8,813	—	3	0.03	—	"
August to November, 1910	"	—	22,784	4	—	0.017	"
December, 1910, to March, 1911	—	—	28,294	1	—	0.003	"
April to August, 1911	—	—	18,939	3	—	0.015	"
October to December, 1911	—	—	9,340	1	—	0.010	"
January to June, 1910	Damba Island	6,356	—	2	0.031	—	"
May, 1911	"	885	—	1	0.11	—	"

* In these early experiments the monkeys were examined only at intervals of seven days. As batches of flies were being fed daily it is therefore impossible to estimate accurately the number responsible for each infection.

small number examined, and the impossibility of recognizing more than one infected fly in any given experiment, all demand due consideration. In spite, however, of the theoretical sources of fallacy, these infectivity experiments do undoubtedly supply an index to the state of affairs on the deserted lake shore. As the figures may be quoted, it is as well to determine what conclusions can be drawn from them as they stand—assuming them to be valid.

The first three experiments of this table deal with wild flies caught at Entebbe by the first Commission of the Royal Society. Hut-tax labourers were encamped on the lake shore close to the place where flies were caught. Other flies were obtained from the shore line or the Botanic Gardens. No antelope would be available to these fly, as the constant presence of natives had long driven them away. Hippos and crocodiles, however, were common. The tax labourers were removed during the second of these three experiments.

It will be noticed that the infectivity of the flies diminished with the withdrawal of the infected natives. These hut-tax labourers were infected to the extent of 1 in 3 or 4.

Regarding the subsequent experiments, it must be noted in passing that there is a considerable difference between the number of "flies fed" and the number of flies "put on." In Sleeping Sickness Report XIII an experiment was given to show that mere introduction of the proboscis of an infected fly is sufficient to infect a monkey, without any actual blood-sucking. The earlier Commission only counted those flies which had sucked so much blood that it was visible in them to the naked eye, and therefore it is possible that the total numbers of flies given may be too low, and the percentages of infected flies too high. For supposing an infective individual of a given batch of wild flies had merely inserted its proboscis, or had taken only a minute quantity of blood, it would have been rejected in the counting as not having fed. In comparing percentages, it is therefore necessary to bear this point in mind, if both classes of data are not available. In considering the figures for 1908-09 it must be recollected that from November, 1908, to September, 1909, a large number of natives were still present in the fly area, as the island populations were not removed until August and September, 1909. The spot where the flies were caught is almost directly in the line

taken by canoes from the heavily infected island of Damba to the mainland landing places. If, therefore, the "wild fly" trypanosome of the recent experiments is, in spite of presumptive evidence to the contrary, a true antelope trypanosome, then these 1908 and 1909 flies would be harbouring *both this antelope organism* and *T. gambiense*, for both are capable of development in the fly. It would accordingly be reasonable to expect that the flies of this period—an interregnum between the old and new conditions—would show a high percentage of individuals which could infect monkeys. The figures are, however, 0·039 per cent. to 0·11 per cent., which, it will be noticed, are lower than those reached at Entebbe, where only *T. gambiense* was available for the fly.

After the removal of the natives from the islands the percentage drops somewhat, as would be expected, but a considerable number of flies still retain their infectivity to monkeys. It will be seen that the figures from March to June, 1910, do not differ appreciably from those obtained while infected natives were still available to the fly. Subsequently the percentage decreased slightly to the 1911 level of 0·01.

From section *J* it would appear that if the "wild fly" trypanosome were an antelope parasite like *T. uniforme* or *T. vivax*, there would be a rise in the percentage of infected flies on the removal of the natives, and not a fall. This argument is based on the presumption, supported by facts quoted below (*J*), that a trypanosome indigenous to antelope will be more readily transmitted by the local tsetse than a newly introduced human organism.

It is remarkable that the percentage of infected flies in Damba Island in May, 1911, is actually higher than it was shortly after the removal of the natives. This might at first sight suggest the presence of a true antelope trypanosome. The conditions of this island are, however, unique. Situtunga are exceedingly numerous, and since the departure of the natives they are frequently seen on the strip of shore where the flies are caught. In former times this particular beach was backed by a large village, so that the antelope would seldom or never reach the water's edge at this point. Unfortunately, no details are available concerning the infectivity of Damba flies to *T. vivax* and *T. uniforme*. From inoculation experiments referred to below (*I*), it is probable that relatively large numbers carry these trypanosomes. In any case,

since the removal of the natives the frequent presence of antelope on the fly shore will ensure a greater proportion of the fly being infected with any suitable trypanosome which the animals may have in their blood. It will be noticed that, in spite of the exceedingly favourable conditions for the spread of the antelope trypanosome among the fly of this Damba beach, the percentage of infected flies is only slightly greater than that reached with *T. uniforme* and *T. vivax* on the mainland. Here far fewer animals reach the fly during their biting hours. In other words, the evidence of this section tells against the deduction that the "wild fly" trypanosome on the Damba Island is an antelope parasite and not *T. gambiense*.

(G) *Is there in Uganda any species of trypanosome, other than T. gambiense, with which the "Damba" and "wild fly" trypanosome can be identified?*

The antelope trypanosomes, *T. vivax* and *T. uniforme*, have been recovered from cattle in Uganda. It is reasonable to suppose that if the trypanosomes discussed in this paper were genuine antelope parasites they would have been recovered from domestic animals by one or other of the Commissions. There is, however, no trypanosome strain known in Uganda the animal reactions of which correspond with those of the lake shore organism, except *T. gambiense*.

The evidence of sections F and G is thus in accordance with that of the previous sections.

(H) *Is there any evidence that a mammalian trypanosome could persist in wild flies for years without some mammalian intermediary?*

In this connection three points demand consideration—that is, (1) Longevity of the fly; (2) hereditary transmission of the trypanosome from the parent fly; (3) infection of one fly from another by contaminated feeding.

Longevity of the fly will not alone explain the continued infectivity. So far no one has proved that *G. palpalis* is capable of surviving for one year. Hereditary transmission, though obviously difficult to exclude by experimental proof, has never been known to occur. Experiments conducted on this point by the Commissions of the Royal Society have always proved negative.

Experiments carried out at Mpumu laboratory have always

failed completely to support the theory that there is any transmission of trypanosomes among *G. palpalis* by contaminated feeding.

There is, therefore, no particle of evidence to justify an affirmative answer to question H.

(I) *In the prohibited lake shore area what is the proportion of wild antelope which is infected with T. vivax and T. uniforme—that is, genuine antelope trypanosomes non-pathogenic to man, and carried by G. palpalis?*

There is no reason to suspect any one species of antelope of being more or less immune to these trypanosomes.

Considering first the mainland antelope:—

In 1909 five bushbuck were shot and the blood examined microscopically. In two cases the blood was subinoculated into goats, animals susceptible to *T. vivax* and *T. uniforme*. One of these antelopes was found to be infected with *T. vivax*, which appeared in the subinoculated goat. Examination of blood slides alone is insufficient to determine the percentage of infected antelope. Three of these five bushbuck were not proved, therefore, to have been negative. At the time of these experiments *T. uniforme* had not been recognized as a species distinct from *T. vivax*, and it is quite possible that had it been present it might have escaped detection. In taking the percentage of infected animals we find, therefore, that at least 20 per cent., and possibly more, carried trypanosomes. The small number of buck examined deprives these figures of much value. In comparing them with others it must be remembered that the animals were shot near Kibanga, at a place where the fly are fairly common.

From August, 1910, to March, 1911, thirty-two antelopes were examined by subinoculation of their blood and by slide examination. *T. uniforme* was detected on three occasions (9·37 per cent.).

From April, 1911, to September, 1911, twenty-three antelopes were fully examined, and *T. uniforme* obtained in two animals (8·69 per cent.).

Antelope shot on the islands:—

In 1911-12 twenty-one situtunga were examined, and three were found infected (14·2 per cent.). Thirteen of these animals were tested by blood examinations only, and this fact must be borne in mind in considering the percentage. Of the eight

animals tested by both blood examination and subinoculation into goats, three were found infected with either *T. vivax* or *T. uniforme* or both. This gives a percentage of 37·5.

Thus at least 10 per cent. of the mainland antelope and 14·2 per cent. of the island situtunga examined were infected with *T. vivax* or *T. uniforme*, or both these trypanosomes.

In reviewing these data it must be remembered that the antelope frequenting the lake shore are limited in their range. Individuals became associated with certain localities. Time and again some easily recognizable animal will be disturbed in its special haunt—a clearing in the forest, a sandy bay fringed with ambatch clumps, or some bare peninsula with forest at its base. For this reason it seems highly probable that certain animals in the prohibited area and on the mainland are much more frequently exposed to fly-bite than others. Unfortunately, the neighbourhood of the fly areas on the mainland is very unfavourable to shooting. A number of the antelope shot were obtained in places where fly are scanty. On the islands, on the other hand, where only situtunga occur, the probability of any given animal being subject to fly-bite is greatly increased. This would account for the higher percentage of infected buck on the islands than on the mainland.

(J) *What is the percentage of wild lake shore flies infected with T. vivax or T. uniforme?*

From August to October, 1909, 6,750 mainland flies were fed upon healthy goats, and *T. vivax* was obtained on four occasions; that is, 0·05 per cent.

In March, 1911, 1,320 mainland flies produced *T. uniforme* once and *T. vivax* once. This gives a percentage of 0·15 of wild flies infected with antelope trypanosomes. The actual percentages for *T. vivax* and *T. uniforme* respectively were 0·08 and 0·09. From May to September, 1911, 3,880 flies produced four infections, *T. vivax* appearing once and *T. uniforme* three times. This gives a total percentage of 0·103 infected with antelope trypanosomes, and a specific percentage of 0·02 and 0·07 for the respective organisms.

It must be borne in mind that in dealing with a goat which has been infected with *T. uniforme* by wild flies it is sometimes very difficult to decide whether *T. vivax* is or is not also present in its blood. This latter trypanosome may, of course, be found

in stained blood slides, or it may be obvious in the fresh blood if present in sufficient numbers. *T. uniforme* is also, however, often exceedingly active in fresh blood. In cases—and they are common—where trypanosomes are scarce in the goats it is often extremely difficult to exclude a double infection of both *T. vivax* and *T. uniforme*. For this reason the percentages given above for *T. vivax* probably err on the small side. From the above figures it will be observed that there is apparently no appreciable reduction in the percentage of wild mainland flies infected with these undoubted antelope trypanosomes. On the contrary, there is an increase over the figures obtained in the earlier experiments. This might be expected from the altered conditions on the lake shore. Since the removal of the canoe-man population game of all sorts can wander undisturbed throughout the fly zone. Formerly the numerous villages and the constant passage of canoes would have compelled the animals to drink during the dark hours. For this reason the antelope will now be more frequently exposed to fly-bite. It is remarkable how frequently a fly-infested strip of coast-line is near the site of a deserted village. In such situations it is highly probable that the fly had small occasion to search for wild quadrupeds as long as the villages remained occupied.

Now, however, these old shambas offer many attractions to buck of various kinds, and the fly are still apparently as numerous as ever. If, therefore, the "wild fly" trypanosomes under discussion is an antelope trypanosome pure and simple, it is difficult to see why it should not follow the example of *T. vivax* or *T. uniforme*. On the other hand, if, as I maintain, it is descended from the *T. gambiense* of the recent epidemic, then the difficulty vanishes. The human trypanosome would not presumably be so well adapted to circulation among buck as a parasite proper to antelope. Certain of the laboratory antelopes have proved relatively resistant to *T. gambiense*. Bushbuck 2,328 and waterbuck 2,378 have given no evidence of infection since the fourth month after their original inoculation with a human strain.* The same idiosyncrasies doubtless obtain in Nature. Then, again, there is evidence to show that *T. gambiense* is less suited to development in *G. palpalis* than are *T. vivax* and *T. uniforme*. In experimenting on the transmission of *T. uniforme* with

* *Proc. Roy. Soc., B*, 85.

laboratory-hatched *G. palpalis* a relatively enormous proportion of the flies used developed flagellates.* In four experiments in which 293 flies were used 56 became infected, or 19·1 per cent. Similar experiments by the 1908-10 Commission with *T. vivax* gave a percentage of 20·1 of the flies used becoming infected with the trypanosome. The Commission gave 5 per cent. as the approximate corresponding figure with *T. gambiense*.

Under the circumstances antelope infected with *T. gambiense* would only be found where the conditions are especially favourable, to the exposure of a large number of animals to fly-bite. Such a locality is Damba Island, and it is remarkable that two out of four young situtunga shot on this island should be found infected with a trypanosome answering to all available tests for *T. gambiense*.

It will be seen that the trend of the evidence of these two last sections in conjunction with sections A and D is strongly in favour of the assumption that the "wild fly" trypanosome is indeed *T. gambiense*, not a purely antelope trypanosome.

Finally, it is contended that the available evidence justifies the conclusion that the trypanosome recovered from the Damba situtunga and from the wild *G. palpalis* on the islands and the mainland coasts is a descendant of the *T. gambiense* of the epidemic.

The figures quoted are regrettably small, and doubtless arguments can be advanced on the other side which are unanswerable by direct experiment. The presumption, in the earlier days of the Uganda Commission, that these trypanosomes were identical with the organism of sleeping sickness, seemed so justifiable that no systematic attempt was made definitely to establish the point beyond reach of criticism. It is probable that the behaviour of these trypanosomes has been altered in the meantime by their sojourn in ruminant blood. Nevertheless, the crucial point now is: Are they still pathogenic to man? And to this query only a series of experimental inoculations into man can supply the answer.

* Fraser and Duke, *Proc. Roy. Soc.*

SWAMP CANCER—EQUINE GRANULOMA.*

By J. C. LEWIS, B.V.Sc.

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History.—The first appearance of this equine disease, known commonly as "swamp cancer," but correctly designated as "equine granuloma," in Australia cannot definitely be stated.

It is probable that it first appeared soon after the introduction of horses into the tropical parts of Queensland, spreading into the Northern Territory and farther into the northern parts of Western Australia.

As far as records show the disease is confined to the northern tropical parts of Australia. Speaking broadly, the parts of Australia where the disease is known will be found to correspond fairly closely with the areas subjected to a heavy tropical rainfall, and where the seasons of the year are divided into two well-marked periods—the wet and the dry.

The diseases which appear in other tropical parts, described under the name of Leeches, Bursattee, borsartige Schimmel-Krankheit der Pferde, do not correspond with "swamp cancer" from the description given by the various investigators, with the exception of the first named.

Though the diseases so described appear to be associated with the rainy season, characteristic features differ so widely that the identity of the two diseases with "swamp cancer" cannot be easily established.

The disease in India, described by Smith and Steel, and in Sunda Islands, by de Haan and Hoogkamer, shows lesions which consist of firm nodules below the skin, particularly in the lips, alæ of the nose, eyelids, and the mucosa of the mouth. No such features are ever seen in the equine granuloma here.

Dawson, of Florida, however, under the name of "Leeches," describes the disease characterized by the formation of tumour-like masses with some of the features of actinomycosis; further, in the granulation tissue, yellow bodies with root-like projections are found. He observed the condition in horses only.

It would, therefore, appear that the Australian disease is distinct from the Indian and the Asiatic condition known as

* Abstracted from the Veterinary Report of the *Bulletin* of the Northern Territory, Australia.

bursattee, &c., and in all probability identical with the Florida disease "leeches."

The question naturally arises whether "swamp cancer" is an introduced disease, or whether the causative agent is a habitant of swampy parts, living a life apart from the animal, and appearing in the horse as an unusual or accidental phenomenon.

Unfortunately, records are not obtainable giving the locality of the first occurrence, and though the disease has been well known in Queensland for many years, it cannot be definitely decided in which portion of Australia the disease first appeared.

As Dr. Gilruth has shown in his investigations on the introduction of "redwater," stock reached the northern portion of Australia in the early part of last century—about 1820-1824—many years before Queensland was even sparsely stocked. Among the stock introduced for the military settlement at Port Essington were a number of Timor ponies, but if the same explanation can be accepted for swamp cancer as regards introduction as for the entrance of "redwater," that is, through the introduction of stock from Indian islands, much of the mystery could be cleared up. The fact that wild Timor ponies are found with swamp cancer lesions perhaps strengthens the argument. If, on the other hand, the explanation of introduction cannot be taken, then it has to be accepted that the causative agent is native of Australia.

The time of the year when the disease most commonly appears is at the beginning of the wet season, which lasts from October till April, sometimes setting in early, at others appearing in the animal near the end of the season.

The localities where the disease is met with are low-lying, marshy grounds, usually dry during the dry season or drying up so as to leave nothing more than an isolated pool here and there. It is not usual to associate the disease with those water-holes known as billabongs, generally of some depth. The more likely places are the lagoons, harbouring weeds, reeds, &c., and seldom more than a few feet deep. It is in such places, to escape from the attacks of the flies, and where the disease is contracted, that the horses make for, standing up to the abdomen in water from sunrise to sunset. It is on the parts accessible from the water that swamp cancer is usually seen, or on parts that can be easily reached from the water. These parts include the legs, the under

surface of the abdomen, the inside of the thighs, but lesions are rarely seen higher than the elbow-joints. The neck, head, back and rump are rarely, if ever, affected.

Just a word about the transmission of the disease by means of flies. One strong point in opposition of this theory is that the position of swamp cancer and the parts mostly attacked by flies do not agree. The head, especially below the eyes, the front



FIG. 1.—Active lesion of knee, three to four weeks' duration. Purulent and sanguineous discharge. No pain present. Lameness shown due to mechanical interference with joint action.

of the nose, the under surface of the neck, and the chest are the parts attacked by diptera just as much as the legs and abdomen, and, incidentally, rarely, if ever, cancer affected.

The disease is one of external infection, the "cancer" being the lesion of the local infection. There is no history of spread from the primary focus to parts at a distance, for a horse infected with a solitary growth, and removed to a locality free

from the disease, will not develop more growths, though the lesion may increase in size. Secondary growths are never found in the internal organs. There may be as many as thirty growths on a single animal, each representing a separate infection. Recovery from cancer in one year in no way means immunity to further infection. An animal may be infected and cured for years in succession. No tendency to the disease is inherited, and no immunity is inherited by the foal from a cancerous mare. The disease is not one of infection through the alimentary canal. Horses habitually bite the affected part if it is within reach, yet no internal infection results, and no spread of the disease is seen in the mouth, though wounds exist due to dental troubles.

A foal may, with no risk of infection, suckle from a mare suffering from a cancer affecting the greater part of the udder. Feeding experiments with the disease's tissues have failed to reproduce the disease in non-affected horses running on the same pastures.

Entrance through abrasions is a possible theory, but is overwhelmed by the evidence that, though biting and sucking the lesion is common, no case is known of a cancer originating in the mouth. Attempts to artificially produce the disease through an abraded surface with material from a cancerous lesion at all times failed.

No age is more disposed than another; no variety nor sex of animal more likely to be affected than another. The Timor ponies running wild in the Territory are not immune to the disease. Cancerous animals at the onset of the disease show no inconvenience by the presence of the tumours, even when in the vicinity of joints; lameness is not usually seen except where the growth is mechanically the cause.

There is no pain or tenderness about the lesions, though an itchiness is shown by continual rubbing or licking of the affected parts. Though not noticeable in the early stages, a general falling away takes place when the tumour attains any size, the animal looking miserable, poor, and not thriving, although eating well.

A feature of considerable interest and of importance when viewed from the experimental point of view is the fact that there is a well-marked disposition on the part of the lesions, whether on the abdominal region or situated on the limbs, to dry up and

vanish when the affected animal is removed from the pasture and placed in the stable on dry feed.

It is certainly apparent that if tumours of years' standing are influenced or disappear by alterations in diet, the artificial production of the lesion will be a matter of great difficulty if carried out in a stable.

The course of the disease depends to a great extent on its position. The affection low down on the leg—those which are in a position where they can envelop a limb, denuding the bone and vessels as tendons, arteries, nerves, &c.—are most likely to be followed by unfavourable results, and then death ensues, if left to the extremity, from the toxæmia more than from the growth itself. Those lesions which, from their position, have a large area over which to spread without involving important tissues, and where the firm fibrous tissue which always forms in response to the inflammation cannot interfere with important parts, are the most favourable as regards prognosis.

If left to itself the course of the disease at the onset is extremely rapid, growing from a small red point to six inches in diameter in the course of a week. The fibrous tissue reaction is intense, especially when the acuteness of growth is considered. In a year's time, if the animal does not succumb, the tumour may be of any size, the largest being seen on the abdomen, firm, fibrous, not yielding to the touch, the external surface bossy, with points or broken-down areas, and usually a serous discharge, often purulent and ropy, continually exuding from the surface.

Taking the disease on the whole, it cannot be said to be generally fatal. Innumerable instances are to be had of an animal in a condition so far advanced as to be worthless, and turned out in the bush to take pot-luck, brought in after a period of one or two years without more than a scar to mark the site of the former lesion. The effects on the limbs, especially near the foot, generally result in some more or less permanent injury. Those which involve the coronet are the most serious, the hoof being usually lost in the process, and, as a rule, some deformity remains.

The course of the growths is very uniform; all are acute at the onset, and all terminate in chronic fibrous tumours. All the abdominal tumours are the superficial variety, all the others on the limbs are the deep-spreading growths. The growth never

invades bone, thus differing from actinomycosis. Muscle tissue is not invaded, although extensions may have occurred into the connective tissue between the muscles.

The lesion is one confined in nearly all cases to the subcutaneous connective tissue, and is freely movable in the early stages, though becoming firm when any size has been attained.

Naked Eye Appearances.—The first evidence of the growth of a cancer is a small, red, slightly elevated area, about a centimetre in diameter, becoming suddenly denuded of hair.

The lesions are rarely observed in the earliest stages; and some degree of growth is usually acquired before observation is commenced. As a rule, when first seen, the growth is about from 3 to 5 cm. in diameter, and the surface is broken down, showing a granulating, red, uneven face, which bleeds freely on interference. Small yellow caseous bodies can be seen throughout the ulcerating surface, and around the circumference, where the lesion is actively spreading, a circle of these bodies in the form of a thin line indicates the progression of the affected tissues. These caseous bodies, afterwards referred to as "roots" of the cancer, are very characteristic of the lesion, and, though of necrotic nature, are firmly attached to the surrounding fibrous tissue.

The surface of the lesion is always raised from the surrounding tissues, the elevation extending into the apparently unaffected skin. The growth extends subcutaneously around the periphery of the lesion, growing very rapidly; it may be, when first seen, a few centimetres in diameter, and as large as 10 cm. across in six weeks' time. No limit to size seems to exist. When the growth reaches the latter dimensions, the acuteness and rapidity of extension is lessened, and some attempt made at repair. Further extension is often seen where growth occurs subcutaneously, breaking down of skin only taking place at fluctuating points. These points give the bossy appearance to the chronic lesions. When a point has broken out and discharged the purulent contents of a small cavity lying below the dermis, the opening closes and heals, to be opened by further discharge at a later period. As before stated, growths of greatest chronicity are seen on the abdomen, where the surface allows of great extension. In some cases the greater part of the lower abdominal surface is covered with cancerous tissue, spreading

at some points, and healing at others. This spontaneous recovery nearly always occurs after the chronic stage has been reached. It is probably due to the intense fibrous tissue reaction encapsulating the area containing the causative agents of the lesion. A permanent blemish of scar tissue and the absence of hair always remains as the result of the lesion.

If careful examination be made of a cancer lesion at the earliest recognizable stage, it will be found to be a red, oozing area, denuded of hair, standing out from the surrounding tissues.

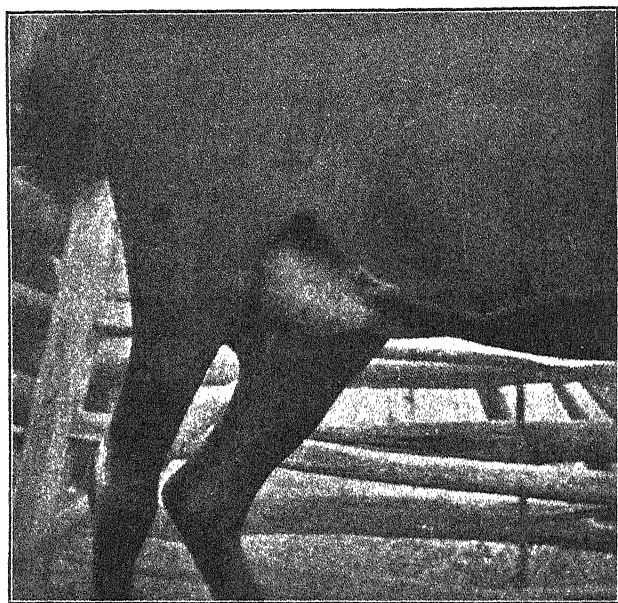


FIG. 2.—Chronic growth in the udder of mare, six months' duration. Almost complete absorption after a period of three months' stabling.

The caseous areas are seen in the earliest stages, and are diagnostic of the lesion. If such lesion be excised, it shows that the tissues involved are confined to the skin proper, without even extension into the subcutaneous connective tissues, though marked thickening may have occurred. As the diseased area increases in size, the surface breaks down into an oozing, granulating mass, with a serous discharge, containing caseous material. In the larger lesions the tumour-like condition is seen, large masses rising abruptly from the level of the surrounding

tissues, either covered with skin or having a surface of oozing, granulating tissue. Attempts at healing are seen when the acute nature has passed off and the subcutaneous connectives are involved, showing an intense fibrous tissue reaction.

In the growths of two and three years' standing the lesion presents quite a different appearance, though retaining the chief features. In these, which are seen mostly on the abdomen, the whole of the skin covering the lesion has not broken down. The fibrous tissue may have attained a thickness of two or three inches over a large area beneath the skin, and contain many small cavities, which are continually breaking out on the surface of the lesion, discharging serosanguineous material containing the caseous masses. When the contents of the cavity are discharged, healing takes place. The bossy surface of the old lesions is due to many cavities immediately below the skin, each boss representing a fluctuating point ready to break and discharge, and leaving, on healing, a small white scar devoid of pigment or hair.

Those lesions which occur on the abdomen spread over most of the undersurface without involving any deeper tissues or interfering with any important structures. When on the legs, the tumour is often more serious, especially in the vicinity of joints or near the foot. The growth often completely surrounds the lower part of the leg, and as the circumference of the lesion increases in size, bone and tendons may be laid bare. Pain is not apparent, and rarely lameness is shown, though growth may be deep down, between the flexor tendons.

When near joints a mechanical lameness may be present, resulting from interference with the joint action.

The mammary gland is often affected in suckling mares, and also in fillies which have never been in foal. Enlargement of the gland is marked, the nipples appearing as if the animal were suckling. Blood-vessels in the neighbourhood are always distended and prominent.

Mention must be made of the characteristic odour of "swamp cancer lesion," which is always present and very noticeable. It is a sickly serous smell, and perhaps somewhat similar to the odour of a pleuro-pneumonia lung during the acute stage.

If a cross section of a growth be made during the acute stage

numerous foci will be seen scattered through fibrous tissue. The foci vary in colour and size, according to the stage of development.

The first indication that a focus is to be formed is a small hæmorrhagic area of about half a centimetre; this increases in size to 2 to 4 cm., when a small necrotic centre can be observed. Later, definite necrotic areas with hæmorrhagic zones can be seen, the red zone gradually becoming paler, until only the necrotic area is left surrounded by fibrous tissue.

The older foci are sections of this caseous material, which appears to occupy sinuses through the growth, and form, when extracted from the tissues *en masse*, branching objects, which are referred to by stock owners as the "roots" of the cancer. The caseous branching objects are used by laymen as an indication of the depth to which the infection has spread. In removing the growths, excision deep enough so as not to leave any portion of such roots remaining generally means cure.

Between the numerous foci is fibrous tissue, firm and bleeding freely when cut. I have observed no calcareous deposit even in the oldest lesions, though in the disease "Leeches," of America, calcification of caseous areas is frequently found.

Microscopic Appearances.—Sections made from early lesions, taking it that infection lies at the spreading edge where normal and diseased tissues meet, and where the line of progressive caseation is seen, are the most important for microscopic examination. Sections of the older chronic lesions show little more than dense fibrous tissue and scattered caseous areas. If examined under the low power, a section through the edge of an actively spreading ulcer shows that there is a well-marked line dividing the diseased from the healthy tissue, and that the growth of the lesion is preceded by a breaking down of epithelium of the *rete malphigii*, and particularly around the hair follicles. The epithelial cells have lost their outline, and stain badly, while pigment can be seen scattered through the tissue where the cells have become disintegrated.

The subcutaneous connective tissue appears crowded with migrating leucocytes of the polymorphonuclear variety, and though a small percentage of eosinophiles are present this variety is at this stage comparatively absent to the well-marked infiltration which is seen in the more chronic lesions.

Throughout the breaking down epithelium numerous foci are present which simulate miliary abscess formation. These foci vary in size from mere groups of leucocytes to foci which consist of a wide zone of polymorphs around a necrotic area.

The tissues affected are firstly the skin, and secondly the subcutaneous connective tissue in which the fibrous mass of the new growth forms. Bone is never invaded nor muscular tissue, and it is rare to find the lesion invading even the connective tissue between the muscles themselves.

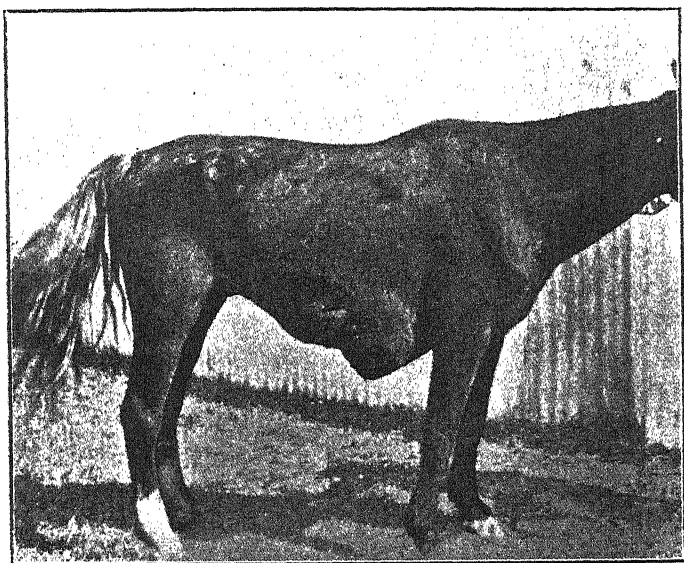


FIG. 3.—Chronic lesion on abdomen of four years' duration; firm, unyielding, surface bossy, with small breaking down areas. Almost total absorption on stable feed.

Careful observation has been made, without success, for intracellular parasites, but neither the surface epithelium nor that of the hair follicles, or the sebaceous glands, show the presence of any parasites in the form of organisms or fungi to account for the leucocytic invasion that is so well marked in these areas, even in the earliest lesions of the disease.

Early foci formation is seen among the broken down epithelium and in the vicinity of hair follicles. What determines such formation cannot be demonstrated with the microscope.

Scrapings of tissue and contents of foci from active lesions

when examined in the fresh condition exhibit no motility on examination, and no spirochætes can be demonstrated by refraction methods.

Apart from the foci, the sections correspond to those of actively granulating tissue. The fibrous tissue reaction is active and always well marked. Sections of chronic lesions show a dense infiltration of eosinophiles, with scattered caseous areas, but no marked phagocytic reaction.

It need hardly be noted that the term cancer given to the disease is not based on its microscopic structure. No carcinomatous structure is present, and the spontaneous recoveries which are frequently seen remove it from the category of malignant tumours.

In the human being the conditions with which eosinophilia are associated are well known; asthma, verminous infections, and eczema being the principal diseases. With the equine disease, the presence of parasites, either metazoon or protozoon, is naturally suggested where eosinophilia is so well marked, but careful examination of the blood shows that the increase is not a general one, and that the eosinophilia noted in the lesion is a local infiltration, and, further, the more chronic the lesion, the greater the degree of eosinophilia observed.

All attempts to cultivate the virus of the disease have, up to the present time, given negative results. In Florida investigators have endeavoured to claim discovery of the causative agent in the shape of a mould, but as no confirmation could be given by inoculation into animals, it is probable that some associated fungus has been isolated.

On culture media and various media for the cultivation of protozoa the results have all been of a negative nature. Several associated organisms and moulds from time to time occur on incubation, but fail to be pathogenic on inoculation into the horse or laboratory animals.

Besides general failure to cultivate the virus on all known media from the surface of the lesion, and from the deep foci not connected with the exterior, all endeavours to artificially produce the disease by direct inoculation of the discharges, transplantation of various portions of the active lesion, have met with failure. Taking into account that the period of incubation might extend over a long period, a year was allowed from the date of the experiments, and still no results were obtained.

Similar experiments were made to reproduce the disease by feeding, and by inoculation of abraded or scarified surface with diseased tissues, with negative results.

The general inclination on the part of stock-owners in Australia, and elsewhere where the disease is seen, is to believe that leeches are the cause, or are associated with the cause, of the disease. This theory is strengthened by the fact that in nearly all cases the position of the lesion is situated on those parts which are accessible from the water when an animal is feeding or standing in a swamp.

However, taking into account the great number of times every horse in swampy country must be bitten by leeches, the ratio of infected horses to the number of leech bites is infinitesimally small. Possibly the percentage of infected leeches, like infected mosquitoes, is likewise small, so that experiments with leeches from swamps can hardly be considered of importance, if the possibility of dealing with an infected leech is so reduced. However, the experiment was carried out on thirty horses, allowing them to stand in swamp until a leech was attached and noting position of bite, date, marks of horse, &c. These were observed either by owners or by myself for periods up to one year, but no positive results have been seen.

To test the leech theory in a systematic way, leeches were obtained from swamps in cancer-producing districts, and fed on cancerous animals. Twenty leeches were fed on lesions in various stages of development, from the acute, rapidly growing variety to the fibrous forms; ten others were fed on the margin of the growth near the spreading edge; ten on infected animals away from the lesion. In feeding these leeches, no particular liking was shown for the lesion itself; in fact, much more trouble was experienced in getting the leeches to feed on the lesion than on the non-infected parts. Again, in the natural condition how small the chance of a leech ever being able to bite a cancer-infected area? All the experiments with cancer-fed leeches were done on horses running on pastures principally in the low-lying swampy ground, and, to avoid confusion arising should an animal become naturally infected, careful note was made of the position of the leech bites.

Had positive results been obtained, I should be justified in giving detailed account and dates of all experiments with leech

feeding and inoculation of animals, but it will suffice here to state that no positive results were obtained.

Further experiments were tried on the assumption that some agent, naturally living in swamps on weeds or free in water, may assume a parasitic nature when finding lodgment by accident in the tissues through abrasions or injuries. Collections of swamp water were made, some from the surface, some near the bottom of swamps, and varying amounts injected subcutaneously after filtration, or allowing the suspended matters to precipitate. To test the possibility of the action of vegetable products as acids or enzymes producing lesions, small quantities of plants found in swamp were collected, kept in swamp water and injected subcutaneously and intradermally, all with negative results.

Clinical Articles.

BOTRYOMYCOSIS IN A COB.

By G. MAYALL, M.R.C.V.S.

Bolton.

ON February 13 a bay gelding cob, 9 years old, was brought to the surgery for my attention. I found a hard and sensitive swelling on the point of the shoulder, measuring 8 in. long, 6 in. broad, and protruding about 5 in. high. Gave a bottle of cooling lotion (pot. nit. and ammon. chlor.) and prescribed 80 gr. of pot. iodide in the drinking water three times daily.

On February 17 the tumour was less painful, but still very hard. Injected tincture of iodine, 80 minims, into the depths of the swelling at three different points. The ordinary hypodermic syringe was used for this operation and three syringefuls of tincture of iodine, 4 dr. in all, were injected. A blister of 1 in 8 biniodide of mercury was then well rubbed in over the tumour and the pot. iodide still continued as medicine.

On February 19 the shoulder was injected and blistered again, and the medicine repeated.

On February 21 the tumour fluctuated and was soft at one point. It was lanced there and about a quarter of a pint of pus let out. Pot. iodide, 80 gr., and digitalis, 40 minims, three times daily prescribed.

February 22 and 23.—Swelling visibly lessened in size, but still hard and with an extensive base. Bathed with dilute creolin, well squeezed, injected with tincture of iodine at the incision wound and internal medicine continued. The wound was injected and dressed daily until March 3, when the swelling was still less in size. On that date it was reblistered with 1 in 6 of biniodide ointment.

On March 8 a stick of silver nitrate was inserted into the operation wound and its depths were well causticked. The same procedure was adopted on March 12. To-day, March 15, hardly a trace of the tumour can be seen, the contour of the shoulder has resumed its natural form, and the cob is fit for work. The medicine is, however, still being prescribed. The tumour was quite an inoperable one, except with considerable danger, and I think, even if it could have been operated on, that a favourable result has been produced more quickly than would have ensued from operating.

STERILIZED OIL IN ABDOMINAL SURGERY.

BY VETERINARY SURGEON RODER.

IN order to hinder the development of pathogenic micro-organisms in the abdominal cavity of the horse during operations 50 grm. to 100 grm. of sterilized paraffin oil* is poured in through the operation wound. Once a 1 per cent. addition of camphor was introduced into the paraffin oil. The sterilization of the oil is effected by heating, that is, by boiling in a water-bath. The oil is poured in at blood-heat. No disturbance of the general condition of health occurs.—*Oesterreichische Woch. für Tierheilkunde*.

FUNCTIONAL EXAMINATION OF THE KIDNEYS IN THE HORSE.

BY LORSCHIED.

ACCORDING to researches undertaken by Lorscheid on horses affected with contagious pleuro-pneumonia, it is certain that this malady is almost always accompanied at the febrile rise by a nephritis characterized by albuminuria elimination of epithelial cells, and the presence of different organic sediments in the urine. These troubles are never encountered in strangles and catarrhal pharyngitis. Ordinary pneumonia is never accompanied by urinary troubles; diabetes and lumbago (hæmoglobinuria) do not demonstrate the existence of renal lesions.

To establish a differential diagnosis between parenchymatous and interstitial nephritis, it is necessary to recollect that in the former the elimination of colouring matter is slow, not abundant, and of short duration, whilst it is prolonged in interstitial nephritis.

The test for colouring matter in order to verify the renal permeability is made by injection of 8 dg. of carmine or indigo; one can then use an injection of 10 cg. of phloridzine, which determines the glycosuria.—*Deutsche tierärztl. Woch.*

* The "paraffin oil" referred to is "Paraffinum Liquidum," of the British Pharmacopœia.—G. H. W.

THE FLANK INCISION IN CRYPTORCHID
OPERATIONS OF THE HORSE.

By E. C. WINTER, F.R.C.V.S.

Limerick.

I HAVE operated upon a large number of cryptorchid horses, both by the inguinal and the flank method, and on comparing the



Figure showing situation of the flank incision.

results I am very much in favour of the latter, as I consider that it gives the best after-results.

The situation I prefer is as shown in the photograph, just above the fold of skin in the right flank. Sometimes I open on

the right side and sometimes on the left, depending upon which testicle is retained in the abdomen.

The skin is shaved and rendered clean by scrubbing with ethereal soap and antiseptics or by painting with iodine and the incision made almost in a vertical direction, being closely sutured afterwards.

My experience of it is that one gets very little swelling, no interference with urination, no chance of subsequent hernia, and no adhesion of bowel or omentum to the operation wound.

AN UNUSUAL LESION IN THE HEAD OF A COW.

By J. A. JORDAN, M.R.C.V.S.

The City Abattoir, Belfast.

THE two photographs here reproduced show an interesting lesion in the head of a beast which was brought to the abattoir, presumably for food purposes, but for which the owner never came back to claim, even to obtain the price of the hide.

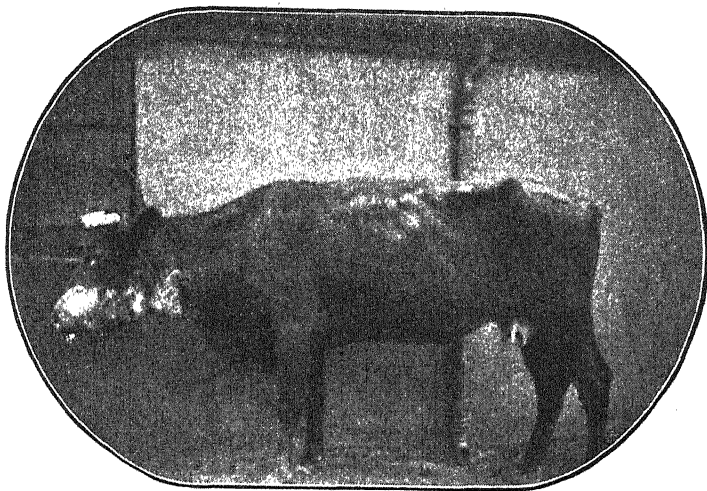


FIG. 1.—Side view of the whole beast.

My attention was called to the animal by one of my inspectors. The cow was much emaciated and her face, especially on the left side, enormously swollen, the skin being badly affected with dermatitis and covered with a thick crust of scurf and scale. Saliva was flowing freely from the mouth, and I thought at first that it was a case of aphtha or perhaps actinomycosis, but on *post-mortem* examination I was unable to find any confirmatory lesions of either of these diseases.

The skin, however, over the lips and cheeks, when cut across, measured rather more than 5 in. in thickness and resembled the appearance and consistency of fat bacon.



FIG. 2.—Photograph showing the swollen cheek and lips.

No trace of injury could be found, and as the owner did not return I was unable to obtain any history. I have never before seen a case like it, and am unable to offer any suggestion as to the actual cause of the malady.

LUMBAR PARALYSIS IN COWS.

By G. MAYALL, M.R.C.V.S.

Bolton.

Case 1.—January 14, called to a black-and-white cow, calved three days, unable to rise and showing moderate excitement, temperature 103° F. Gave $\frac{1}{2}$ lb. of salts and left two doses of chloral and pot. bromide. Blistered her loins with cantharides blister. Cow got up two days after, gave a good supply of milk, and has remained quite right since.

Case 2.—Roan cow, down on December 8, 1913, and unable to rise. Subject quite restful, but not cuddling; no rise of temperature. Prescribed drachm doses of am. carb. and tincture

of nux vomica night and morning and blistered her loins as in Case 1.

December 10.—Cow still down; repeated the blister and left more medicine.

December 13.—Subject still recumbent and blowing a bit. Blistered both her hocks and left medicine, liquor am. acet. 1 oz., glycerine of belladonna 1 dr., three times daily.

Cow got up on December 15 and has remained right since. This subject had calved six weeks before I attended her for the paralysis.

Case 3.—Red-and-white cow, calved three days, in a loose box, chewing her cud, but quite unable to rise. Blistered her loins on February 3, and left nux vomica and am. carb. Attended on February 5 and found cow still down and unable to rise. Blistered her loins again and applied blister to her hocks. Left nux vomica and am. carb. as medicine. She got up on February 7 and has done well since.

Remarks.—No loose boxes on the farms in Cases 1 and 2 and subjects had to remain in bad stalls. In none of these cases was there any coma. In none of them was the udder injected, and two of them did not rise until their hocks had been blistered, as recommended by Horst-Tempel. Unless there are pronounced symptoms of milk fever farmers prefer the udder not to be injected, and where the cow is looked on as a milking machine there is something in the objection.

OVARO-HYSTERECTOMY IN THE SOW.

By H. ASHLEY YOUNG, M.R.C.V.S.

Dunmow.

I HAVE within the past few years operated upon several sows with dystocia, and all have proved successful, more by luck than judgment, I am inclined to think. The first animal had a severe kick from a horse, which caused depression of the pelvis on the near side, with the result that there was not sufficient room for the foetus to pass in the ordinary way. I informed the owner that the only thing to do was to operate as otherwise she would certainly die, and after gaining his consent I gave her chloroform, well washing her side with ethereal soap and shaving all hair from the seat of incision. The latter was made from the hip to within three or four inches of the mammary glands, directly through into the abdomen, and a towel wrung out of warm antiseptic solution (Kresophen) was held by an assistant to press the bowels back whilst I secured the left horn of the uterus. A ligature of ordinary iodoform tape was applied above the ovary, and the complete horn and ovary excised; in like manner the right horn and ovary was excised, after removing both horns to the outside of abdomen. A double ligature was then applied to the uterus and the whole organ removed. Deep sutures were then put

through the muscular portions of the side, and finally the skin was sutured, and a compress of cotton-wool (boracic) placed over the wound, the whole being held in place by a many-tailed bandage placed around body.

The animal seemed much exhausted after recovering from the effects of the chloroform, but within three hours of the operation drank some milk, and continued to improve within the next few hours and walked about, although very weak and lame. However, she continued to improve, and at the end of a week the deep sutures were removed, the wound doing well. The outside stitches were removed a few days after, and until this was done fresh compresses were applied twice daily, or oftener if displaced by the movement of the animal. Eventually the sow was sold fat for the sum of £8.

Four other similar operations have been performed, and all have done well, but I have never operated if any septic discharge has been observed from the vagina. My reasons for operating were simply because to allow the animals to remain in such a condition meant death to the sow, and loss to owner, and also that the operation was very similar to spaying (except as to its being on a larger scale), the latter being an operation in which I knew that the percentage of deaths was so very slight as to be considered almost *nil*.

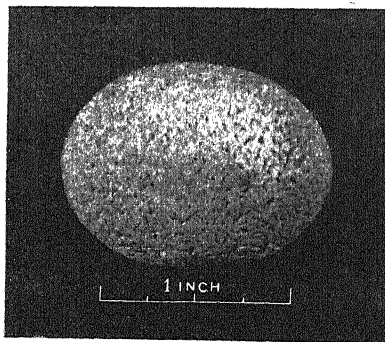
Canine Clinicals.

AN INTERESTING CYSTOTOMY.

By W. C. HAZELTON, M.R.C.V.S.

Buckingham.

THE stone, of which a photograph is shown herewith, was removed from the bladder of a Pekinese bitch, aged 4 years, by supra-



Bladder calculus in Pekinese bitch.

pubic cystotomy. The animal had shown symptoms of bladder irritation for 12 or 15 months, continually squatting down and

passing small quantities of urine, the irritation at last becoming so troublesome that I decided to operate.

The anæsthetic used was chloroform, morphia being first administered, and a supra-pubic cystotomy was made in the usual way.

The stone weighed three-quarters of an ounce, and was about as large as a small walnut. The bitch made an uninterrupted recovery, and is now quite well and pregnant.

LUXATIO FEMORIS IN THE DOG.

By JULIUS DROSZ.

Dantsig.

THE author observes that luxation of the femur which is only rarely noticed in the horse, occurs much more frequently in the ox and dog. From the statistics of the clinic for small animals at the Berlin College, luxatio femoris in the dog, in the years 1893 to 1912, shows a percentage of 0·2 to 1·0 of cases treated. Drosz has also examined several cases pathologically and anatomically. The dislocation of the hip joint in the dog, which occurs far more frequently, especially in towns and cities, than is generally supposed, arises exclusively from external causes, and is really a luxation of the femur above the cotyloid cavity. The ligamentum teres and joint capsule are both weak in the dog, and the capsule being torn the head of the femur slips out.

Cure results by the formation of a connective tissue sac round the luxated head of the femur (nearthrosis). The limb becomes functionally capable again, but its original mobility is never regained.

Translation.

EXPERIMENTAL VACCINATION AGAINST SHEEP-POX.

By M. CHARLES DUBOIS.

Veterinarian to the Department of Gard, France.

AFTER making numerous experiments on sheep of different breeds with varying doses of vaccine, the writer of an interesting paper in *La Revue de Médecine Vétérinaire* arrives at the following conclusions:—

(1) Vaccination against sheep-pox produces far greater disturbance, both local and general, in very susceptible breeds of sheep than in the Algerian breed, which is not so prone to the disease.

Lambs and rams bear vaccination better than ewes, for in lactation the secretion of milk is considerably and persistently lessened, and in advanced gestation abortion has been known to occur, though only in rare instances.

(2) Vaccination confers on animals so protected a reliable immunity, which not only allows them to be exposed without danger to the ordinary risks of contagion, such as continual association with the infected, but it also enables them to resist drastic experimental inoculation.

(3) Vaccinated animals can be left in contact with the non-vaccinated without any danger to the latter.

(4) The employment of vaccines appears to be less efficacious than the practice of using serum for arresting infection in areas while sheep-pox is prevalent.

(5) In healthy flocks which are being exposed to contagion sensitized vaccines are especially useful. Considering their particular value in prevention they may be considered the best means of fighting the disease efficaciously—always supposing the immunization to be durable.

If, as we anticipate, subsequent researches confirm our satisfactory investigations, there is reason to hope that sheep-pox will speedily disappear—almost, if not completely—from France. In our opinion it would be sufficient to attack the very important centre of contagion which exists in Camargue, by vaccinating all the flocks in the district two or three months before the usual importation of Algerian sheep into France.

Being inexpensive, easily employed, and, above all, not likely to spread the infection, sensitized vaccines alone could be profitably used in such widespread operations which would undoubtedly have decisive results in the campaign against sheep-pox.

Reviews.

Das Kehkopfpfeifen beim Pferde (Roaring in Horses). By Dr. H. A. Vermeulen, Prosector in the Anatomical Institute of the State Veterinary School, Utrecht. Printed by A. Oosthoek, Utrecht. Price 4 marks 50 pfennigs. Published 1914.

This book deals with the literature, anatomy, physiology, and neurology of roaring. The composition and functions of the thyroid glands are discussed in twenty-nine pages of the letter-press, and Chapter V deals with the employment of thyroid gland powder as a therapeutic agent against paralysis of the recurrent nerve.

The author puts before his readers a new point of view for the etiology of left-sided paralysis of the larynx in the horse. He shows that this laryngeal affection is not localized in the larynx, but is a symptom of a widespread nerve disease. On anatomical grounds he is convinced that there is considerable predisposition to the disease. Finally, he relates experiments undertaken by himself in the therapeutical treatment of roaring by means of thyroid gland powder. The experiments are not conclusive, although results in some cases were favourable. Any-

body who desires to read some acute reasoning on the subject of roaring should get Dr. Vermeulen's book. It consists of ninety-seven pages, with seventeen illustrations in the text, and six coloured lithographs of microscopical preparations. G. M.

Encyclopédie Cadéac: Pathologie Interne-Nutrition, Auto-intoxication, Appareil Urinaire, Peau par Cadéac. One hundred and forty-three figs. in the text. Publishers: J. B. Baillière et Fils, 19 Rue Hautefeuille, Paris. Price 6 francs bound.

This is the seventh volume of the series which Professor Cadéac has produced in his "Encyclopédie Veterinaire." The ailments of nutrition, auto-intoxication, the urinary apparatus, and skin are dealt with and in many cases illustrated. Horses, cattle, sheep, pigs, goats, dogs, cats, and birds all come under the author's ken in the discussion of their varied diseases in the above connection. For the last ten years Professor Cadéac has been collecting material for his encyclopædia, and so far the result of his labours has been in every way satisfactory. The days when the horse and cow alone seemed worthy subjects for the veterinarian's attention are long since past, and the present-day practitioner has to pursue his studies in much wider fields. In the volumes comprising this encyclopædia the veterinary surgeon may gain adequate knowledge of the various diseased conditions affecting his many patients. All the sections in this work are good, and if we pick out one for special mention it is that dealing with skin ailments, which covers 275 pages. The articles on sarcoptic mange of the horse and scaly leg in fowls are masterly expositions of the subjects. The prescriptions given in the skin section are simple, and have all stood the test of practical utility. The work is a worthy successor to those that have preceded it, and we congratulate the author on having dealt with his theme so widely and thoroughly. The book is remarkably cheap, concisely written, and of inestimable value to veterinarians who can read French. The binding is tasteful and would single out the book for attention in any library, and the reader may take up the work for an odd leisure hour during the day and peruse it with profit and pleasure. G. M.

The Diagnosis of Dourine by Complement Fixation. By John R. Mohler, Adolph Eichhorn and John M. Buck, Pathological Division, Bureau of Animal Industry, U.S.A.

The authors give at the outset a brief introduction dealing chiefly with symptomatology, followed by an extremely interesting history of dourine in the United States.

In view of the great difficulty experienced in the diagnosis of the chronic and latent forms of the disease, the value of serum diagnosis as an aid in checking outbreaks and attempting its eradication is obvious. On the other hand, this method of diagnosis is of necessity somewhat limited in its application, since it can only be adopted in the case of animals which are kept

under a certain amount of restraint. In the case of outbreaks of dourine occurring among animals bred and kept under range conditions, and subject only to an annual round up, it is by no means easy to carry out a clinical examination, and the difficulties attending the withdrawal of blood for the purpose of testing the serum are almost insurmountable. Since, however, dourine exists among horses which can be safely handled, the complement fixation test should prove of inestimable value as an aid to the diagnosis of the disease.

The most serious problem which confronted the authors was the preparation of a suitable antigen. As was to be expected, the results obtained when suspensions of pure trypanosomes were employed as the antigen were much more satisfactory than those obtained when extracts from the various organs of diseased animals were used. The former antigen, however, was not employed for routine diagnosis on account of the difficulty attending its preparation and the small amount available.

The most suitable antigen for the purpose, according to the authors, consisted of a saline suspension of the ground-up spleens of white rats which had been infected with *Trypanosoma evansi*, the group nature of the reaction being taken advantage of. While such a crossed specificity doubtless exists to some extent, the results obtained would perhaps have been more convincing had a more specific antigen been employed. While the antigen was titrated both against known negative and positive sera, no mention is made of titrations being carried out with the spleens of normal rats as a control. It would seem that this would have been a valuable guide since apparently in some cases quite small quantities of antigen were capable of absorbing the complement due, the authors suggest, to the presence of an excessive amount of proteids in the spleen. Although it would appear that the technique might be to some extent improved upon, the results obtained were of great interest, for while the blood of normal horses showed in the presence of this antigen no fixation of the complement, that of horses affected with dourine possessed a complement binding titre varying from 0.15 to 0.02.

The complement fixation test as an aid to the diagnosis of trypanosomiasis in both man and the lower animals should prove of the utmost value, but in localities in which more than one variety of parasite is found the antigen would necessarily have to be of a more specific nature.

J. B. B.

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THE LATE MR. G. L. Y. INGRAM, M.R.C.V.S.
Veterinary Surgeon to the Brown Institution.

THE VETERINARY JOURNAL

JUNE, 1914.

THE LATE MR. G. L. Y. INGRAM, M.R.C.V.S.

By the death of Mr. Ingram the veterinary profession has lost a man of brilliant promise, one whose career had commenced so well that his future seemed assured. Workers in the domain of veterinary pathology and bacteriology are all too few, especially in Great Britain, and the loss even of one of them cannot but be felt and much deplored. After qualifying in 1909 at the London College he occupied the post of House Surgeon, and then obtained the position of Veterinary Surgeon to the Brown Institution. Here came his opportunity and he did not fail to seize it, doing a considerable amount of original research work in the laboratory in collaboration with Dr. Twort, the Superintendent. Together they worked at several diseases of animals, including tuberculosis and Johne's disease, and it was in connection with the latter that his name will always be handed down in the world of science. Various attempts had been made to cultivate the specific organism, but all the results were negative until 1910, when Twort and Ingram succeeded in growing it outside the animal body on a special medium, and the interest awakened in this disease culminated in a text-book embodying all the latest details, symptoms, treatment, &c., of value to the clinician. For this alone the veterinary practitioner owes him a debt of gratitude, for few men have, in so short a space of working years (he was only 30) done more. If by his earnestness his example may have instilled fresh ideas and hopes into others his all too brief career will not have been in vain.

Editorial.

THE MATRICULATION EXAMINATION.

THE question as to whether the matriculation standard shall or shall not be kept exactly the same as for students of human medicine is one about which there should be no argument. The veterinary profession is strong enough to stand by itself, if necessary, in regard to many things, and it has been wise of late years in not slavishly copying its more powerful fellow-worker; but whether it is wise for us to adopt a standard of preliminary education which allows a student who could not enter the sister profession to come and enter ours is quite another matter.

Let all commence on exactly the same foundation, so that what is good enough for human medicine is good enough for us, but do not let us be retrograde in this respect. Such a step will not help to any appreciable extent to fill our colleges with students, but in any case the preliminary weeding out is just as necessary for us as for them, and the work which the veterinary practitioner undertakes requires just as much brain and knowledge as that of his human *confrère*. It is usually necessary that with his many disadvantages, he should be more resourceful, and no one better than a teacher or practitioner of the past decade can appreciate the improvement which the adoption of the higher matriculation examination, "the same as for the medical," has made upon the veterinary practitioner of to-day; and this, not only for himself but judged by the respect accorded by the public, who, after all, are by no means slow in giving their judgment.

If the leaders of the medical profession deem it wise to delete certain lower standard matriculation examinations we shall by no means be doing wrong in copying their example; for our men, like theirs, need the best of brains, and the higher the standard of education at the commencement, the better the foundation upon which to build.

General Articles.

SLEEPING SICKNESS, TSETSE, AND BIG GAME.

BY GEORGE PRENTICE, L.R.C.P. & S., D.T.M.

Kasungu, Ugara, Nyasaland.

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British Medical Journal.)

I HAVE read with much interest the articles and correspondence in the issues of the *British Medical Journal* for June 21 and July 19, 1913, regarding tsetse, big game, and sleeping sickness in Nyasaland and Rhodesia.

With the exception of three furloughs spent in Britain I have been at work in the territories referred to since 1894. For many years after my arrival on Lake Nyasa my practice extended over a very wide area, and it so happened that many of my journeys were made through districts which are now infested with tsetse-fly. It has been my custom to use riding animals whenever it was possible to do so. Frequently I had opportunities of shooting game as we travelled. In the early days I frequently had dogs with me. The presence of riding animals and good dogs made me very careful about the possibility of encountering tsetse-fly when on tour, and a close observation was made when game was shot as to whether or not tsetse happened to be about. Time and again I travelled through districts where in pre-rinderpest days Arab caravans used to travel by night in order to avoid their animals being bitten by tsetse. Yet in those early years—1894, 1895, 1896—both Nyasaland and Rhodesia were remarkably free from that fly. The explanation given me by many headmen and others was that since rinderpest had killed off most of the big game tsetse-fly had disappeared. I can speak from personal experience and observation of many hundreds of miles of territory where in those early days not a single tsetse-fly was to be encountered, and where to-day it swarms, and not a single domestic animal can live. I have watched the spread of tsetse-fly for many years now, and long ago warned the Government of the risks they were incurring in allowing it to spread. I appealed to the authorities in Nyasaland and Rhodesia to arrest the spread of tsetse, both on the grounds that *Glossina morsitans*

was killing off domestic animals and that it might yet prove to be a carrier of a trypanosome pathogenic to man.

Those of us who are working on the spot attribute the enormous increase of tsetse-fly during recent years entirely to the great increase of big game. The increase of game we attribute entirely to the protective measures employed by the Government. About these we need not write in detail meantime. The laws were passed with a view to protecting the wild fauna of this part of Africa, and they have succeeded, I should think, beyond the wildest dreams of those who were responsible for bringing them into being. The wild animals have been preserved, but domestic animals have been sacrificed, and now we are paying a heavy penalty in human lives for having interfered with the balance of Nature.

In a district in which the natives owned 200 head of cattle an incursion of tsetse took place following upon the herds of buffalo that came into it. Within two years the natives owned only 80 head. Under normal circumstances there should have been an increase of 50 per cent. per annum—300 head in all, instead of 80.

In another district known to me where the people were rich in sheep, goats, and cattle, a recent investigation revealed the presence of only four dogs, and these recently imported. Besides having lost their stock, the people are now being killed off by *G. morsitans*. Yet with all this going on the people are not allowed to act in self-defence. Game laws which would turn any Government out of power if imposed at home are forced upon a primitive people here who have no means of redress.

To those of us who take an interest in politics, it is not a little amusing to find the Chancellor of the Exchequer posing in the matter of game as the friend of the down-trodden peasant at home, whereas a member of the same Government, in the person of the Colonial Secretary, carefully protects the huge animals that eat up the native's crops, kill off his cattle, and carry in their blood the disease germs of certain death to human beings, and that notwithstanding a promise we believe he made to a deputation representing all the missionary societies at work here—that on evidence being adduced that game was responsible he would not fail to act. His replies to Dr. Chapple in the House of Commons have already been referred to in THE VETERINARY JOURNAL. Not

only do elephants destroy the mealie crops, they this year (1913) fought the owners for possession of the gardens. In my hospital at Kasungu I had recently four patients at one time who had been mauled by wild animals. Three of them had been hurt by elephants in the gardens.

There is one aspect of this question to which I have sought to draw attention. The infant mortality in this country is appalling; so, too, is the mortality among adults from diseases of the alimentary tract. The native has no sick-room cookery worthy of the name. We have sought to teach him the value of milk as a diet for infants and during disease. But along comes tsetse, and this potential food supply in sickness is cut off. Thus indirectly by destroying the food supply and directly by carrying the deadly trypanosome does tsetse kill off the population. When we speak of the population being killed off we mean what we say. The disease, both in Rhodesia and Nyasaland, is much more serious than certain reports make it out to be. The first cases I had in my hospital here were from a district where sleeping sickness was not known to exist. Reports reached me of a very fatal disease having broken out among the natives, who spoke of it as a virulent form of measles. A lad in our employment entered the district and got badly bitten by tsetse. He became very ill, and was carried back to my hospital. I thought he had tick fever, and proceeded to examine his blood for spirochætes; I found trypanosomes. So far as my knowledge goes, that was the first case for which *G. morsitans* was held responsible by a medical man. The Government sent a medical officer into the district and other cases were found. The virulent form of "measles" had carried off many victims before the real nature of the disease was diagnosed. It has carried off many more since.

How do those of us who are working on the spot believe that the disease should be eradicated? For we do believe that the disease should never have existed here, and that it can, and ought to be, eradicated. We believe that for the time being a severe onslaught must be made upon the wild animals until these are driven back from human settlements and from the public highways. Until the present danger is past, all wild animals capable of acting as a reservoir of trypanosomes should be treated as vermin and destroyed or driven out just as rats are destroyed during an outbreak of plague. I, for one, would

welcome an outbreak of rinderpest such as swept this country in 1893 and 1894. It would leave us with a clean country, and, having learnt our lesson in a hard school, we should be slow to impose laws protecting game. We cannot cure the disease when once it has taken hold of human beings. Only those who have seen the victims can realize the horror and the hopelessness of it. We can starve out tsetse by depriving it of its supply of warm blood, and at the same time we can remove the natural reservoir of the disease by driving out or destroying the game. It has been asserted that tsetse can and does exist where it cannot possibly depend upon game for its sustenance, game being absent. This does not hold good of *G. morsitans* in Nyasaland and Rhodesia. Instances cited by the Colonial Secretary do not stand the test of investigation.

Again, we are told that if game is driven out tsetse may attack man and his domestic animals more vigorously than at present. In that case, when rinderpest killed off the game tsetse ought to have betaken itself to the nearest villages to feed upon the people. But it did not. It disappeared or remained only in small patches among the foothills, where small herds of game escaped the rinderpest. Similarly, in South Africa, when the Boers shot off the wild animals tsetse ought to have remained behind to feed upon man and his domestic stock. But it did not. There is ample proof that wherever game is killed off by disease, or hunted out, *G. morsitans* disappears. There is no proof to the contrary. I hold that the time for experimenting has passed, and that we ought at once to adopt such measures as may be necessary to save the people here from further risk and loss. Traders, farmers, planters, transport riders, and missionaries ask for permission to act in self-defence, permission to save their interests from ruin and themselves and their people from danger. If we make a mistake we suffer for it, and can blame no one but ourselves. But why should we be called upon to suffer for the fads and mistakes of people at home? We hold that further temporizing, in the light of our present knowledge, is nothing short of criminal folly.

With reference to Dr. Neave's suggestion that the game within a certain area should be impounded and destroyed, I may say that this suggestion was made fully two years ago. We asked, when the first epidemic broke out in Nyasaland, to have the game

destroyed. This was refused, on the grounds, among other reasons, that the outbreak was distinctly localized, and that any interference with the game might cause the animals to spread out and carry disease into clean districts. On the strength of this statement I suggested to the Acting Governor that he should impound all the animals within the area mentioned, and once and for all stamp out the disease by exterminating the animals. To this proposal I got a reply that, while His Excellency appreciated my good intentions, he did not regard the proposal as practicable.

In conclusion, I should like to express my appreciation of and gratitude for the work of the Liverpool Commission, which has settled once and for all many hitherto hotly disputed points, and also my gratitude to the *British Medical Journal* for the publicity it is giving to the work of Dr. Warrington Yorke.

VACCINE TREATMENT OF MASTITIS IN CATTLE.

By H. A. REID, F.R.C.V.S., F.R.S.E., D.V.H.

I WAS much interested in the remarks of Mr. Arthur Payne, F.R.C.V.S., which appeared in the issue of the *VETERINARY JOURNAL* for February last concerning vaccine treatment of mastitis in cattle. As I have had considerable experience of this form of treatment in streptococcal infection of the udder both in cows and goats it may not be out of place if I add a few remarks to those of Mr. Payne in regard to the results obtained by the application of vaccine therapy in this condition. I may state at once that the use of bacterial vaccines in the treatment of mastitis has not met with very great success in my hands, nor have my colleagues in the field, using vaccine prepared at this laboratory, met with much greater encouragement. The limitations of such treatment are appreciable only when one considers for a moment the pathology of the disease in question, and apparent successes may also be discounted unless one makes a point of verifying beforehand whether the mastitis is actually due to infection by streptococci, or whether it arises from other causes such, for instance, as overstocking, chill, traumatism, &c. In the latter case the condition would remain unaffected by the injection of streptococcic vaccines, and would generally yield to the older forms of treatment usually adopted.

During a course of experimental vaccinal treatment of mastitis in

1911 I was much struck by an article appearing in the *British Medical Journal* contributed by Dr. T. H. Benians, of the London Hospital Bacteriological Laboratory, and Assistant in the Inoculation Department of that Institution.* Dr. Benians has had considerable experience in the treatment by means of vaccines of acute mastitis in women, consequently the article is of much comparative interest and gives some valuable information respecting the pathology and treatment of this condition.

According to Benians the infective bacteria in the human subject are *Staphylococcus aureus* and *S. albus*, and less frequently streptococci. The organism may enter the breast from the blood-stream, but more often gains access either through cracks and fissures of the nipples contaminated by the pathogenic bacteria or through the milk ducts direct.

Where infection takes place through fissures of the nipple, the organisms are conveyed by the lymphatics, and set up suppuration commencing in the connective tissue of the gland. Where, on the other hand, infection proceeds by way of the milk ducts, the inflammation extends outwards from the gland ascini to the interstitial tissues. Benians distinguishes two types of mastitis, whose onset bears evidence of a different mode of infection. The minority of cases are of the nature of a diffuse cellulitis, characterized by a firm, uniform swelling, limited to one part of the gland, and frequently proceeding to suppuration. In these cases there is generally no obstruction to the milk flow in the earliest stages. The type of case most frequently met with, however, begins as a lobular mastitis, usually as a sequel to the sudden cessation of suckling. The milk becomes clotted in the distended breast, and there is some pain and rise of temperature. In these cases resolution is the rule, rarely does suppuration take place. Lesions of the nipple are seldom found to account for this condition. Staphylococci are nearly always found in the milk clot. The streptococcal form of mastitis met with in woman appears, according to Benians, to proceed from an infected nipple lesion; it spreads by the lymphatics and involves the interglandular tissues without at first causing obstruction of the milk. The clinical features of such cases are parallel with what obtains in the more commonly encountered forms of bovine mastitis.

* T. H. C. Benians, M.R.C.S., &c. "The Use of Vaccines in Acute Mastitis," *British Medical Journal*, April 15, 1911.

In regard to treatment Benians found that when the invading organisms were lying in the lymphatic vessels and connective tissue of the gland, parts well flushed by the body fluids, vaccine treatment was successful and suppuration could be prevented by their judicious use. When, however, the milk has clotted in the ducts, permitting bacteria to multiply in the stagnant secretion, which, moreover, cannot be reached by the opsonin carrying body fluids, the results of vaccine treatment were not satisfactory. Dr. Benians points out that the anatomical conditions present in such cases are to a large extent opposed to the success of vaccine therapy. "The bacteria are multiplying inside the ducts and ascini, shut off from direct action of the body fluids by a well-marked basement membrane. They are, strictly speaking, outside the body altogether. . . . looked at in this light it would be surprising if they (the vaccines) should succeed."

In human practice the suppurating gland is surgically opened so as to allow free drainage, and unless this is done the vaccine treatment is of no avail, "for it appears that where pus is pocketed the condition is only aggravated by the administration of vaccines."

I have drawn largely upon Dr. Benians' observations because they help to explain in a great measure the small success attending the use in our hands of vaccines in the treatment of mastitis in cows.

When it is realized that primary, acute cases in cattle are rarely brought under the notice of the veterinary practitioner, the unsatisfactory results following this method of treatment can readily be understood.

In goats experimentally infected better results have been obtained, but the open conditions under which these animals were kept nullified to a large extent the beneficial effect derived from the vaccine.

In this country two varieties of streptococcal mastitis have been observed. One of these is caused by a streptococcus which conforms culturally to *S. mastitidis* (Savage),* and another due to infection by *S. pyogenes*. The first named (*S. mastitidis*) produces acid reaction in three days when sown in media containing lactose or saccharose, but this reaction does not take place when it has been added to the culture medium, and not generally in salicin, raffinose, or inulin. It coagulates milk.

* Savage, "Bacterial Studies of Milk," "Local Government Board Report," 1906-07.

S. pyogenes, on the other hand, produces acid in mannite and milk, but does not clot the latter.

It is probable that streptococci of other varieties may also be present occasionally in milk from certain cases of mastitis, but unfortunately a systematic examination into the cultural characters of streptococci in each case has not been undertaken.

Staphylococci are commonly met with in milk from healthy cows' udders, and may be regarded practically in the light of harmless saprophytes. In certain cases, however, I have observed severe mastitis in which only staphylococci could be observed and isolated from the udder secretion; in such cases the staphylococci resembled *S. albus*.

In the great majority of cases of mastitis due to streptococcic infection staphylococci are also found to be present. They develop upon agar in discrete, semi-translucent colonies, having a tendency to overgrow the finer, dew-like streptococcic culture. In order to ascertain whether staphylococci of this character were capable of setting up mastitis when introduced into the healthy udder, or, indeed, whether naturally occurring cases of mastitis might not be to some extent dependent upon the symbiotic relationship of staphylococci and streptococci, I proceeded to introduce a pure culture of these staphylococci into the udders of two goats by way of the teat duct. The inoculations succeeded in setting up a mastitis which led to notable changes in the milk secretion, consisting of catarrh of the epithelial cells of the ascini, accompanied by the presence of pus cells and immense numbers of the infective cocci. The inflammatory symptoms subsided about the fifth day following the inoculation, and within a week the subjects of the experiment had recovered, while the milk resumed its normal appearance. It seems possible that the presence of cocci in the gland may, under certain conditions, act, as it were, as an adjuvant in the production of streptococcic mastitis. The following instance may be cited as of interest in this connection: A healthy cow received 0.5 c.c. of broth culture of staphylococci derived from the milk of a healthy cow with clinically normal udder. Four days later symptoms of mastitis were manifested, with numerous staphylococci in the secretion. Eighteen days from the date of inoculation this cow showed typical symptoms of streptococcic mastitis due to presence of *S. mastitidis*. Needless to say every care had been taken to avoid accidental infection by this organism. This cow was inoculated with a dose of 500,000,000

streptococci (autogenous vaccine), and the same quantity of killed staphylococci isolated from "normal" milk were also injected at the same time, the case being viewed as a mixed infection.

On the following day slight improvement was evinced, there being less pain on manipulation of the udder, while the milk contained a notably less proportion of inflammatory products. Five days later a further similar dose of mixed vaccine was given, and improvement in the shape of lessened induration of the affected quarter was noted to take place within the next three days. The right fore-quarter was now found also to be affected, probably from accidental infection from the left. Streptococci were evident in the milk secretion from this quarter, which was slightly swollen and painful around the base of the teat.

One more injection of 500,000,000 mixed staphylococci and streptococci was made and clinical symptoms gradually subsided, but streptococci could be recovered from the milk after six weeks had elapsed, and the cow was still in an infective state. The animal was finally sold for slaughter.

The question of the apparent transmutability of streptococci is also of much interest, as the following instance will serve to illustrate:—Experimental cow (No. 8) received 2 c.c. pure culture of a streptococcus isolated from the udder of a healthy cow showing no symptoms of mastitis. The inoculation was made by means of a sterile canula passed up the teat duct into the milk sinus. Twenty-four hours later the inoculated quarter showed signs of inflammation, and the milk secretion became abnormal in appearance. Microscopic examination showed it to contain large numbers of epithelial cells and leucocytes, but no organisms could be demonstrated upon direct microscopic examination.

After incubation at 37° C. for twenty-four hours, streptococci could be discovered in this milk. These gave the cultural reactions of *S. mastitidis*. In four days following the primary inoculation the disease had assumed the appearance of a typical streptococcic mastitis. In thirteen days the streptococci had apparently disappeared from the secretion, but returned again seven days later on the advent of cold weather. After two months the cow was slaughtered. The udder presented the usual pathological picture of mastitis, with considerable induration of the affected quarter, while streptococci were present in the remote ascini of the gland. No curative treatment was attempted in this case. It serves to demonstrate the fact that an

apparently non-pathogenic streptococcus may assume, under certain conditions, virulent properties towards animals of the same species.

I do not propose within the limits of this contribution to cite a number of cases treated by bacterial vaccines, but as an instance of the unreliable nature of this form of treatment in bovine mastitis, the following is perhaps worthy of mention :—

Shorthorn cow, third calf, calved about four months, affected with mastitis in both hind quarters. The case had been allowed to proceed for nearly a fortnight before it was secured for vaccine treatment. The affected quarters were hard and rather painful to the touch, and the secretion from them was rich in purulent material ; the case had reached a subacute stage. *S. pyogenes* was isolated from the secretion and a vaccine prepared accordingly. An initial dose of 500,000,000 was given and this was increased up to 1,000,000,000 in the course of nine days. Satisfactory results followed the primary injection, for in a week the milk from the affected quarters, which beforehand had been pustular in appearance, had returned to its normal condition so far as its microscopic appearance was concerned, although an excess of cellular constituents was visible on microscopic examination of the secretion. Shortly afterwards the right fore quarter was found to be affected, probably as a result of accidental infection from the back quarters. Inoculation with 1,000,000,000 dead streptococci was followed by marked amelioration in the condition all round, which lasted until the fourth day following. A relapse then occurred, the case appearing to be as bad as ever, the back quarters again sharing in the inflammatory condition. Further inoculations of vaccine did not appear to favourably influence the course of the disease. Notable oscillations in the condition of the udder and secretion during the period of treatment were seen to follow any marked climatic change, cold, and especially wet weather, exercising a decided retrogressive effect. This is so evident in all cases under vaccine treatment in the field that I consider it to be one of the weakest features of the method as applied to veterinary practice, particularly in this country where cattle are not housed, and where the provision of comfortable accommodation for a sick beast is often unobtainable.

I believe that vaccine treatment may in some measure retard the process of fibrosis or induration of an infected gland which causes the animal to become "blind" in the affected quarter, and constitutes one of the most serious aspects of the disease. In several

cases treated by vaccines, which have been kept under observation for periods up to five months, no noticeable induration had occurred, although streptococci were present throughout this period and the milk remained infective. This is quite exceptional, induration of one or more quarters followed by permanent loss of the secretory function being the rule in the majority of cases of streptococcic mastitis. Should the inoculation of vaccine exert this beneficent effect it will alone constitute a very favourable point in regard to this method of treatment, for it is well known that cows when they become "dry" recover from mastitis, and, provided induration of the affected quarter has not taken place, will come into profit next year free from disease, the reason for this being that the carbohydrate, in the form of milk sugar, upon which the streptococci seem to be highly dependent, has been lost, thus depriving the organism of a suitable medium in which to propagate.

It may be remarked that no reference has been made to the reaction as indicated by estimation of the opsonic index in relation to cases of mastitis treated by means of vaccine. When first I commenced this treatment I had no proper facilities for carrying out this procedure on a large enough scale to be of any value. Moreover, experience in certain cases treated by vaccines where estimation of the opsonic index has been attempted has led me to consider that under purely natural conditions—i.e., animals exercising in the open, exposed to any climatic conditions which may prevail, and entirely unsheltered—the opsonic index as a measure of phagocytic activity is quite unreliable. Further, it has been shown that a high index cannot be taken to indicate immunity or denote progress towards recovery, neither does a low index prove the converse. Conditions of rest, so important to ensure in the majority of bacterial infections under treatment with vaccines, are practically impossible to obtain under any circumstances in regard to animals. Careful clinical observation is of paramount importance. Too large or too frequently repeated doses of vaccine must be strictly avoided, and inoculation should never be repeated during periods of depression characterized by noticeable retrogressive symptoms in the case under treatment. Inoculations during adverse climatic conditions should likewise be avoided when possible.

Whatever form of treatment is resorted to, proper attention must be given to the local condition of the udder. The quarters should be thoroughly milked out, the milk cisterns being completely emptied of

the contained clot, which forms such a suitable nidus for the propagation of the invading organisms. To effect this, it is necessary to gently but firmly squeeze the teat from above downwards, commencing at the base of the udder, and working down repeatedly, in order to break up and exude any clot which may have formed. This process should be gone through three times a day, and should always precede any form of treatment such as the injection of antiseptic solutions, which still find favour with some, although, in my experience, they are worthless for treating streptococcal infection of the udder. The injection of antiseptics into the udder, if carefully done with properly sterilized instruments, certainly possesses the advantage of hastening the "drying off" process, and thus indirectly aids in preventing the conveyance of the disease by infective material.

It would appear that some reliable method of treating contagious mastitis has yet to be evolved. I propose to try the effect of serum inoculation, which is claimed to give satisfactory results in the treatment of this disease in Holland. The serum is prepared by the repeated inoculation, in gradually increasing quantities, of living cultures of streptococci into the jugular vein of cattle. I have injected living cultures up to 350 c.c. in this manner without any untoward result, and I have now a large amount of this serum ready for future use. I fear that the limitations referred to above, in connection with vaccine therapy, will also prove an insuperable difficulty in regard to treatment by means of serum. Meantime mastitis constitutes one of the most serious menaces to the dairying industry throughout the world, and nothing should be left undone in an endeavour to find some effective method of treating this disease whenever it makes its appearance in a herd.

In conclusion, I may say that I have tried various methods for preparing vaccine. I have discarded sterilization by heat in regard to *S. mastitidis*, and now simply add to the bacterial emulsion 0.3 per cent. tricresol, which I find equally effective, and which has seemed to render somewhat better results than in the case of vaccine sterilized by heat. I have not yet had the opportunity to see the work on "Vaccine Therapy" written by Mr. W. M. Scott, F.R.C.V.S., but I look forward to its perusal, and I agree with Mr. Payne in his remarks concerning the necessity for a work of reference for the use of veterinarians on this important subject.

THE CURATIVE TREATMENT OF HÆMORRHAGIC SEPTICÆMIA IN CATTLE BY THE ADMINISTRATION OF IODINE.*

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DURING the past two years a large number of experiments have been carried out from time to time to test the influence of antiseptics and other drugs on the course of the disease in rinderpest and hæmorrhagic septicæmia.

The following are the principal drugs whose action was investigated :—

Acids.—Lactic, oxalic, hydrochloric, boric, salicylic, nitric, sulphuric and hydrocyanic.

Antiseptics.—Carbolic acid, iodine, iodoform, mercury perchloride, chinolol, cyllin, quinine, potassium permanganate, mustard oil, hydrogen peroxide, turpentine, guaiacol and thymol.

Other Drugs.—Ipecacuanha, emetine, arsenic, sulphate of magnesium, glycerine, opium, cannabis indica, nitrate of silver and aniline dyes.

Administration was made by the mouth, and, when suitable, by subcutaneous and intravenous injections. Small and large doses, single and repeated, were tried.

As a first experiment, the drug was given simultaneously with the inoculation of the virus, in order to observe if the incubative period was prolonged or the course of the disease in any way modified.

In other tests the treatment was given after the period of incubation, at the first appearance of symptoms, in order to study any curative effect which the drug might possess.

In some cases the disease was well established before treatment was commenced. The severe symptoms were treated and observation made as to how far this assistance prolonged the life of the animal.

HÆMORRHAGIC SEPTICÆMIA.

In cattle the disease experimentally inoculated runs a very much more rapid course than when natural infection occurs. Following the subcutaneous inoculation of 0·1 c.c. of a forty-eight hours' broth culture, the temperature rises two to three degrees in from twelve to

* An abstract of a report from the "Memoirs of the Department of Agriculture in India."

eighteen hours and the animal usually dies in from twenty-four to thirty-six hours. The mortality is very great, especially among young buffaloes. About 90 per cent. of these animals succumb to the inoculated disease.

In the naturally contracted infection the disease runs a less acute course and a greater percentage of animals recover. In a very large number of inoculations, carried out in this laboratory during the past six years, no case has been observed which has recovered after displaying a decided rise of temperature or other symptoms unless he had received anti-serum treatment.

In from eighteen to twenty-four hours after inoculation the organism can be detected by inoculation and cultural methods in the peripheral blood and also in the urine.

It can well be understood that drug treatment of so rapidly invading and fatal a form of the disease held out little hope of success.

Few of the drugs tested for inhibitive or curative power showed any influence on the course of the disease, and details of all the experiments with negative results would serve little purpose. There are, however, two methods of treatment which I propose to describe in detail: first, that with permanganate of potash; and second, the administration of iodine.

Treatment with Permanganate of Potash.

The treatment with permanganate of potash is of interest, as recently Walker in the Punjab has recorded successful results following the administration of this drug in hæmorrhagic septicæmia and rinderpest.

He gives details of twenty-three cases treated with permanganate of potash by a veterinary inspector.

A recovery of 83·3 per cent. for cattle and of 29·4 per cent. for buffaloes is said to have resulted from this treatment.

The administration of permanganate of potash as an internal antiseptic has been tested on several occasions in this laboratory in rinderpest, hæmorrhagic septicæmia, anthrax and other diseases, and all the results go to prove that the drug in no way exercises a beneficial effect. After the publication of the paper above referred to, further experiments were again made with the doses recommended by Walker. One to two ounces of vinegar was added to each dose. Treatment was commenced within six hours after the inoculation of

virus. Hill bulls were used, which are less susceptible than buffaloes. These animals weighed from 100 to 200 lb. The virus used was a forty-eight hours' broth culture grown at 37° C.

Doses of from $\frac{1}{2}$ dr. to 3 dr. were used, but the results proved that permanganate of potash either in small, large, single or repeated doses has no beneficial effect whatever when administered to cattle suffering from hæmorrhagic septicæmia. In all cases treatment was commenced not later than six hours after the inoculation and in two cases a drench was given simultaneously with the inoculation. As the animals which survived showed no rise of temperature or other disturbance they were evidently immune.

Treatment of Hæmorrhagic Septicæmia with Iodine.

Out of a large number of drugs tested in the laboratory, iodine was the only one found to have any action on the course of the disease. When administered either by mouth or subcutaneously as late as sixteen hours after the inoculation of virus, about half the cases so treated recover. At sixteen hours after inoculation, susceptible animals generally show a rise of temperature, uneasiness and loss of appetite, and death follows in from twenty-four to thirty-six hours after the inoculation.

In laboratory experiments when an animal inoculated with hæmorrhagic septicæmia shows a decided rise of temperature or other symptoms of disturbance he rarely survives, unless he has received anti-serum treatment. In many of the cases treated with iodine the animals passed through a fairly severe attack of the disease and recovered. In other cases which ended fatally death was delayed by one to two days.

RESULT.

Out of three buffaloes treated with iodine subcutaneously sixteen hours after the inoculation of hæmorrhagic septicæmia, two recovered, one died.

Seven bulls were drenched with iodine sixteen hours after inoculation with hæmorrhagic septicæmia. Five survived, two died. Two of the bulls which recovered had high temperatures and were off feed for three days.

Two bulls were treated with iodine subcutaneously sixteen hours after inoculation. Both recovered.

Out of six buffaloes treated subcutaneously with iodine sixteen hours after inoculation, four recovered, two died.

Two buffaloes were treated with iodine injected intravenously. Both died.

Out of thirteen buffaloes treated with varying amounts of iodine, injected subcutaneously sixteen hours after the inoculation of hæmorrhagic septicæmia, six recovered, seven died. Out of the latter number death was retarded for three and four days in two cases.

Out of ten buffaloes drenched with varying amounts of iodine sixteen hours after inoculation with hæmorrhagic septicæmia, five lived and five died.

In order to ascertain the lethal dose of iodine administered in drench the following buffaloes were tested with large doses of iodine :—

Buffalo No. 1,340.—Drenched with iodine 4 dr. and potassium iodide 4 dr. in two quarts of water. Died several hours after the drench.

Buffalo No. 1,353.—Drenched with iodine 2 dr. and potassium iodide 2 dr. in a quart of water. Lived, no ill-effect.

Buffalo No. 1,354.—Drenched with iodine 2 dr. and potassium iodide 2 dr. in a quart of water. Lived, no ill-effect.

From the above result it was decided that about 2 dr. iodine and 2 dr. potassium iodide was the maximum therapeutic dose for the animals being tested—namely, buffaloes of one to two years of age weighing from 200 to 300 lb.

Out of four buffaloes treated with iodine subcutaneously sixteen hours before inoculation with hæmorrhagic septicæmia, one lived, three died in a short time after the inoculation.

THE OPHTHALMIC TEST FOR GLANDERS.*

DURING the past few years the ophthalmic mallein test has gained great favour in the diagnosis of glanders. The popularity of the test is rapidly gaining wherever this method has been applied, and among its supporters we find at the present time the best authorities on the subject of glanders and on clinical diagnosis.

The Bureau of Animal Industry, in consideration of the favourable results obtained from this test in other countries, has for a period of more than a year carried out extensive investigations with a concentrated mallein. For this purpose the co-operation of official and

* From the Reports of the United States Department of Agriculture, Bureau of Animal Industry. A. D. Melvin, Chief of Bureau.

practising veterinarians was solicited in various parts of the country. Ophthalmic mallein was furnished to all practitioners who desired to make a careful study of the method and establish its comparative value with other tests for glanders, especially the subcutaneous mallein test. In this experimental work about 18,000 horses have been subjected to the ophthalmic test, and in most cases it has been applied simultaneously with the subcutaneous mallein test. The data collected from the reports of a great number of veterinarians indicate satisfactory results from the eye test, and those who employed the method appear to be unanimous in their preference of the eye test over the subcutaneous test.

The comparative diagnostic tests for glanders which have been carried out by the Bureau of Animal Industry in connection with immunization experiments in glanders, and in several outbreaks of the disease, proved the eye test to be reliable and most practicable. In most of these instances the results were controlled by *post-mortem* examinations.

As a result of these favourable findings the Bureau has decided to recognize this method of diagnosis for the interstate shipment of equines.

This method has a great advantage over others by its very simple application. It may be readily executed by any veterinarian, and its other advantages are that the results are obtained in a comparatively short time and are, as a rule, distinct and definite. The simplicity of its application is plainly manifest when compared to the subcutaneous test, as it is only necessary to drop into one of the eyes of the animal to be tested 3 drops of concentrated mallein or, by a still simpler procedure, to dip a camel's-hair brush into mallein and introduce this into the conjunctival sac of the animal. The reaction usually commences in five to six hours after the introduction of the mallein, and lasts from twenty-four to thirty-six hours. A positive reaction is manifested by a purulent secretion from the tested eye. This may be very profuse or slight, sometimes associated with a severe conjunctivitis and oedema of the lids, and at other times without any inflammatory symptoms being present. At times only a very small quantity of pus may be present in the inner canthus of the eye. At other times the reaction may result in a true pyorrhœa. The reaction manifests itself in varying degrees in different animals, but the intensity of the reaction has no relation to the extent of the disease in the reactor.

The essential factor in obtaining satisfactory results from the test

appears to be in the use of the right kind of mallein. It must be by all means a concentrated mallein, and apparently the best results follow the use of raw or precipitated mallein, the former representing the mallein obtained after the concentration of the filtrate from the bouillon cultures of the glanders bacilli. The ordinary mallein used for subcutaneous testing is not adaptable, and the few failures which have been reported in the literature were due to the fact that the mallein employed was not sufficiently concentrated.

INSTRUCTIONS FOR APPLYING THE OPHTHALMIC TEST.

Before the application of the ophthalmic test the animals should be carefully examined to ascertain whether the eye shows conjunctivitis or other changes which are associated with suppuration. Should such be present, the test should not be applied.



An average reaction to the ophthalmic test.

The test consists in introducing into the conjunctival sac of the eye several drops of either undiluted raw mallein or a solution of precipitated mallein (0.1 to 0.2 c.c. per horse). This may be introduced either with the aid of an eye dropper or preferably with a

camel's-hair brush by applying the brush gently along the inner surface of both the upper and lower eyelids. The other eye is not treated, but serves as a control for comparison of the reaction. For the testing of horses in the same stable the same dropper or camel's-hair brush may be used for all animals, but the dropper or brush should be sterilized before use upon different lots of horses.

As soon as the mallein is introduced into the eye practically all animals show a lachrymation, increased reddening of the conjunctiva, and slight photophobia. No significance should be given to these symptoms. They disappear in one or two hours. A pseudo-reaction can be produced by artificial or accidental irritation of the eye.

The characteristic manifestation of the reaction for glanders commences, as a rule, from five to six hours and lasts twenty-four to thirty-six hours, sometimes longer. It consists of a purulent discharge from the conjunctival sac which is typical and is frequently associated with reddening, swelling, and gluing of the eyelids. It is advisable to examine the tested animals in a good light from twelve to twenty-four hours, or preferably sixteen hours after the application of the test.

A suppurative discharge of varying quantities is considered a positive reaction. The conjunctiva and the eyeball should also be included in the examination after examining the discharge. By removing the purulent discharge (either by the stable attendant or by the animals licking each other, &c.) the positive result may be obliterated. In such cases dried pus may be frequently found on the parts around the eye, or the exposure of the conjunctiva by means of pressure by the thumb and finger will show fresh, purulent material.

Generally the positive ophthalmic reactions are not accompanied by fever or systemic disturbances. Occasionally, however, affected horses are hypersensitive to such a degree that even the few drops of mallein placed in the eye may enter the circulation and produce fever. Therefore, it is advisable, when possible, to accompany the ophthalmic reaction with temperature readings. For this purpose the temperature should be taken twice, the first time when the eye test is being made, and the second time when it is judged. In a doubtful eye reaction where there is an increased temperature of 1.5° F., the test should be considered positive if the animal had a normal temperature at the time the test was made.

In the absence of any secretion the test should be considered

negative. When there is a mucous secretion or lachrymation during the period of reaction the test must be considered as atypical, and in such cases it may be repeated the same day, when as a rule the results are more confirming.

The application of the ophthalmic test should not be repeated more than three times on the same animal within a short period, as experiments show that the reaction after the third application made within three months usually loses its intensity in positive cases and on subsequent tests may be entirely absent. In cases where the results of the second test immediately following the first test are atypical, the blood of such animals may be drawn and forwarded to a laboratory for the serum diagnosis, as the installation of ophthalmic mallein does not influence this method of diagnosis. From experience gained with the eye test such a procedure would become necessary only in comparatively few cases. In the control of glanders, animals may be retested every six months with satisfactory results.

The mallein for the eye test is a clear, syrupy, dark brown liquid, giving off a rancid disagreeable odour. This mallein is supplied in small phials of three sizes containing, respectively, 1 c.c., 2 c.c., and 3 c.c. of mallein. One cubic centimetre is sufficient for testing ten horses. Each bottle is dated, and the mallein is not recommended for use longer than three months after the date on the bottle. The Bureau will be in a position to fill orders promptly, therefore only sufficient amounts for immediate needs should be requested. Partly used bottles should not be kept over from one day to another. The portion of mallein unused at the end of a day should be discarded.

INSTRUCTIONS FOR RECORDING TEST.

The results of the test should be recorded as follows :—

N = Negative. Eye unchanged.

S = Suspicious. Seromucous discharge.

P + = Positive. Seromucous discharge with purulent flakes.

P + + = Positive. Distinct purulent discharge.

P + + + = Positive. Purulent discharge with swelling of the eyelids.

P + + + + = Positive. Strong purulent discharge with swelling and gluing together of both lids.

Clinical Articles.

DEATH THROUGH SUFFOCATION OF A HORSE AFTER THE ROARING OPERATION.

BY STAFF VETERINARY SURGEON DR. LEONHARDT.

IN October a five-year-old horse, which was a bad roarer, was brought to me for operation. The horse had only been brought to my surgery slowly, about 5 kilometres distance, and yet on his arrival he showed difficulty in breathing and made a noise for quite seven minutes. The owner was against tubing, and, having heard of the recent great success of the operation for roaring, he desired me to take the subject in hand.

The horse was cast and the operation conducted according to Eberlein's instructions. Five minutes after operating, and when the horse had got up and stood quietly, sudden suffocation was threatened by spasm-like closure of the glottis. The tracheotomy tube was, however, not used, as by keeping the operation wound opened for a minute the alarming symptoms subsided. As there was a possibility of a recurrence of the spasm at the height of the inflammatory phase, on the second or third day as I reckoned, I ordered an attendant to sleep in the stable at night and introduce a cannula which I left with him in case of need, and at the same time to send for veterinary help. I saw the patient three hours after the operation and gave him four lumps of sugar, which he took quite well. About two hours later I was telephoned to that the horse was suffocating. The horse had again been taken with spasm of the glottis, and the attendant, fancying he could not put in the cannula correctly, had sent for the veterinary surgeon. On my arrival the horse was already dead. The symptoms of suffocation had lasted for half an hour. *Post-mortem* examination showed that the cause of death was inflammation of the connective tissue of the pouches. The other parts of the larynx were normal.

I give publicity to this case because mishaps and bad luck teach as much as successes. Eberlein has noticed two cases of this kind in thirty horses he operated on.

In this case, if I had inserted the tube before leaving the mishap might not have occurred, but I reckoned that as the animal had been so quickly and completely relieved at first a repetition of the bad sequel would not have occurred so soon.

Now in all bad roarers after operating, if occasions warrant it, I shall insert for the first day or two one of Bartheliny's tubes as recommended by Eberlein.

I have had great success with the roaring operation and recommend it strongly when necessary. It can be learnt if the operation is conducted on a dead subject with Eberlein's instructive article at hand.—*Zeitschrift für Veterinärkunde.*

FUNGUS GRANULATION IN THE BEND OF THE HOCK JOINT IN THE HORSE.

BY PROFESSOR SCHWENDIMANN,

Berne.

ABNORMAL granulation and cicatrization in injuries of the bend of joints, especially of that of the hock joint, is not a rare occurrence.

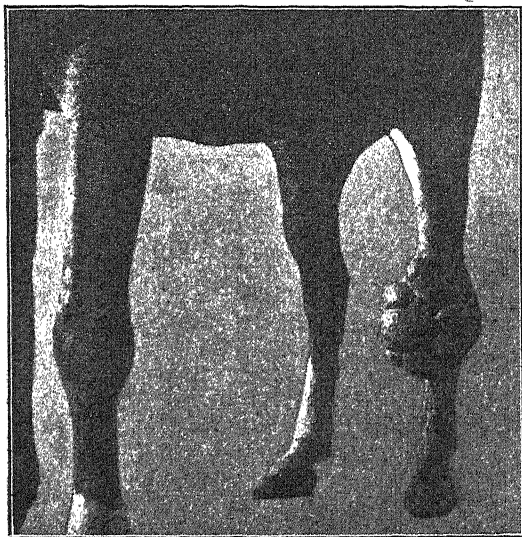


FIG. 1.—Showing the granulations.

A growth of such a kind in a horse brought to the clinic is noteworthy on account of its remarkable size. The four-year-old mare had got her left hind leg fast in some barbed wire and so occasioned injuries to the front of the hock joint. On examination the left hock joint in front had its whole surface above and below occupied and overhung by a large tumour-like growth of oval form. Its length

was 42 cm., the breadth 36 cm., and its thickness 13 cm. from its highest point. Its surface was ulcerated and covered with a greyish yellow false membrane.

The edges were sharply defined, the skin of the distal end of the shank moderately infiltrated. Consistence hard, slight inflammatory appearances, severe itching which caused the horse to bite the swelling. The general condition unaffected ; no lameness, but the foot, owing to limited movement of the hock, carried nearer to the ground in progression. Although the condition promised no favourable intervention the growth was removed under anaesthesia with the

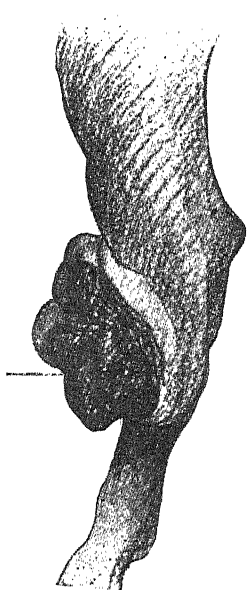


FIG. 2.—The ulcerating wound after removal of the growth.

aid of a pressure bandage and tourniquet. Suturing the wound was impossible ; healing under a scab was aimed at, by exposing to air and a drying powder.

The growth removed weighed nearly 8 lb. and was a connective tissue formation with inflammatory cell infiltration and granulation tissue.

The occurrence of such growths is due to the presence of foreign bodies or dead portions of tissue where a great loss of

substance occurs and there is continued irritation of the wound. In this case there was irritation due to the extreme mobility of the injured region as a result of bending and stretching of the extremity and continued infection. After fourteen days' treatment the horse was sent home to the owner. At the end of January I had word that healing had taken place slowly and that the horse was very much inclined to gnaw the wound, but no new growths had occurred.—*Schweizer Archiv für Tierheilkunde.*

INVERSION AND AMPUTATION OF THE BLADDER IN THE HORSE.

BY STAFF VETERINARY SURGEON NIPPERT.

A THIRTEEN-YEAR-OLD powerful East Prussian brood mare had foaled in the night without help, and had since suffered from prolapse of the vagina, according to the owner. On account of the increasing violent straining of the animal veterinary help was summoned after the condition had existed for forty-eight hours. On my examination I found a swelling between the lips of the vulva about as big as a child's head, pouch shaped, and dark reddish brown. The surface showed a mucous membrane appearance, with blackish red stripes here and there across it. On the upper somewhat flask-like diminished surface of the swelling two little folds were noticeable, from which voluntarily and on pressure a urinous fluid containing flakes of pus voided itself.

Diagnosis: Inversio vesical.—By washing with weak, luke-warm alum solution and massage of the swelling it was put back and secured by suturing, but at night the powerful straining of the animal caused the organ to be again everted. A fresh reposition was now out of the question, since the blackish red mucosa showed yellowish grey spots (necrosis), and the body temperature had risen to 39.2 C. I resolved on operative removal of the bladder. An elastic ligature was easily pushed over and above the openings of the ureters. I sutured the bladder about 1½ cm. behind this place with sterilized silk, and after three days the bladder was removed without special hæmorrhage, the stump remaining cicatrized on treatment with alum solution. After about six weeks the mare could be again used at light work.

If she could be no longer used for breeding, yet for over two years she has been employed at work. Maceration of the skin through continued trickling urine was avoided by daily cleansing and oiling of the parts concerned. On my visit last summer the voidance of trickling urine had decreased, and the dilated ureters appeared to have taken on a bladder-like function.

SOME CASES OF CHRONIC MYOSITIS IN THE FOAL.

By FLORIOT.

AFTER dwelling on the history, etiology and treatment, and noting two forms (fibrous and ossifying) in which chronic myositis may arise, the author reports four cases, two of which he attended personally. There was chronic fibrous myositis of the semi-membranous fascia in three foals (eight, six, and four months old) and one horse, three years old.

In the four subjects the lesions were bilateral, and exhibited by a hard, painless, elongated tumefaction, diverging at one point and directed towards the fold of the buttocks.

In two foals (eight and six months) there was muscular retraction, causing a see-sawing movement and rendering the gait very difficult.

In the foal of four months and the horse of three years only a local tumefaction existed; the croup was not deformed, and the inconvenience of gait less marked.

Treatment consisting of vesicants, liniments and cauterization was quite useless, and the subjects were sold at a loss or sacrificed. In the author's opinion the affection develops soon after birth, and may have its origin in the manœuvres of accouchement.—*Revue Vétérinaire Militaire.*

AN INTERESTING CASE TREATED BY AUTOGENOUS VACCINE.

By R. F. STIRLING, M.R.C.V.S.

Lancaster.

Subject.—Half-bred shorthorn cow in milk.

History.—About the beginning or middle of February the cow was observed to be going lame on a fore-leg when returning from watering.

A nail was found to have pierced the horn just a little in front of one heel. The nail was withdrawn, and apparently had only just penetrated the sole. The usual "dab o' tar" was applied by the owner and the incident forgotten.

About three weeks later the cow was seen to be very lame and poulticing was adopted. This proving a failure I was called to attend on March 8, when the following were the symptoms :—

Symptoms.—Great swelling of the leg from the coronary band to the fetlock, with intense heat and a suspicion of moisture between hair and hoof. One heel was extremely swollen and painful, and a little in front of it on the solar surface was some exudate coming from a very small fissure in the horn. The fissure was opened up and the greater portion of the sole removed. Between the sole and sensitive structures was found the usual pus and debris. There was an opening in the sensitive sole corresponding with the fissure in the horny sole. I did not probe this opening, but contented myself with flooding in tincture of iodine and applying hot compress. I left instruction for continuance of compresses, and asked to be kept posted in the progress of the case.

It was a fortnight later when I was again called, and I found that suppurative openings had appeared at various points around the coronet—these were six in number, and were freely discharging, as was also the opening in the sensitive sole. On probing through any of these fistulous openings one could feel the roughened surface of the os pedis. The owner felt strongly inclined to slaughter the cow, especially as she was losing flesh rapidly and giving little milk. After some persuasion he consented to my trying the use of vaccine.

A sample of pus was collected and forwarded to Dr. Annett, of the Research Laboratory, Grafton Lodge, Runcorn, and four days later I was provided with six 1 c.c. phials of autogenous vaccine, each phial containing 3,000 million organisms, being 1,000 million of each of the three organisms isolated, viz., *Staphylococcus pyogenes aureus*, a micrococcus of the *M. catarrhalis* type, and a diphtheroid bacillus.

March 31, 1914.—First injection of $\frac{1}{2}$ c.c. which was followed by a negative reaction.

April 1, 1914.—Second injection of 1 c.c.

April 4, 1914.—Swelling of the limb decreased, condition of the animal better—viz., feeding well and slight increase of milk. Third injection given.

April 7, 1914.—No pus visible from coronary fistulæ, a slight discharge of sanguineous fluid only. A caseous material has formed in the opening on the solar surface, which is removed, and the part dressed with 50 per cent. solution of chloral hydrate. Fourth injection.

April 10, 1914.—Coronary fistulæ healed. No further discharge has been seen from solar surface. Animal feeding well and milk supply almost normal. Fifth injection given.

April 13, 1914.—The opening in the sole has healed and all bandages have been removed since April 10.

Remarks.—Previous to this I have tried the ordinary stock vaccines in various similar cases in both horses and cattle with very doubtful results, and I cannot speak too highly of the result given in this case under the autogenous method, and that at a cost less than that of the usual stock vaccine. The result far exceeded my expectations; the only “fly in the ointment” being that the owner of the animal cannot comprehend why I cannot treat every diseased condition, from a broken leg to tubercle, in the same manner!

AN INTERESTING BLADDER OF A PIG.

By P. MANUEL, M.R.C.V.S.

Crews.

A SHORT time ago I obtained from the slaughter-house, through the courtesy of the Medical Officer of Health, a specimen of the bladder of a pig which was absolutely full of dirty white sabulous matter.

The animal had given no indication of illness, and the carcase was in excellent condition.

I sent the specimen to Professor Lander, D.Sc., at the Royal Veterinary College, London, and he very kindly examined it, reporting as follows :—

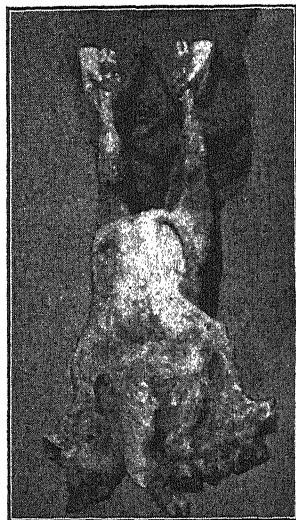
The very interesting specimen from pig's bladder consists of triple phosphate—that is, magnesium ammonium phosphate—associated (naturally) with a little organic matter, but no uric acid. There is also a very small proportion of chalk.

A CALF MONSTROSITY.

By F. H. SANDERSON, M.R.C.V.S.

Darlington.

IN April last I was called to a five-year-old Shorthorn cow, which had been in labour for several hours. I found four legs presented, and upon further examination discovered two heads. After working for an hour and a half without avail I decided to advise slaughter.



The calf remained alive for half an hour after being removed, and a *post-mortem* examination revealed only one set of internal organs, and one abdomen and thorax. There were two complete heads and necks, six legs (four fore-legs, two hind), and two tails, a most peculiar looking combination.

Canine Clinicals.

A CUTLET BONE DEMONSTRATED *IN SITU* BY SKIAGRAM.

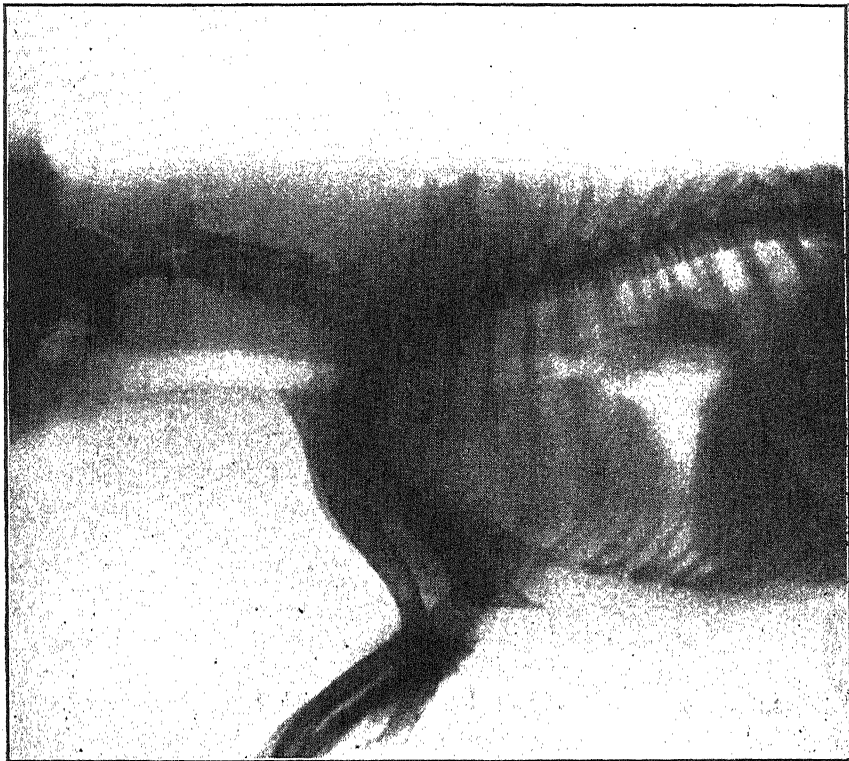
By GUY SUTTON, F.R.C.V.S.

Kensington, W.

THE folly of giving cutlet bones to dogs is well known, but it is not often that one is able to glean a complete history of events from the time of its ingestion until the death of the patient.

A young West Highland terrier, about 15 lb. in weight, was, in

its owner's absence, given the bone of a lamb cutlet. This was on a Saturday afternoon. It appeared perfectly well on the Sunday and Monday. On the Tuesday it vomited and after this act seemed uncomfortable at intervals but took milk. As it had had a good meal earlier in the day very little importance was attached to its disinclination to feed, and on visiting it in the evening there was nothing very striking. Beyond giving some bismuth as a powder, ice to lick, and advising that all food be withheld until the following



day, when I saw it again, the case excited no attention. On being called, the dog ran across the room and appeared to be perfectly bright. After a few minutes, however, it assumed a constrained attitude, stood perfectly still for a few seconds, and then took three or four steps backwards in a perfectly straight line. The clinical picture of the dog was suggestive. I made inquiries and learnt of Saturday's incident. We now offered a few shreds of raw meat

which were swallowed without difficulty. I gave some "tabloids" containing $\frac{1}{4}$ gr. of carbolic acid and requested permission to obtain a skiagraph. This was taken on the following day and demonstrated the presence of a large portion of the bone wedged in the œsophagus immediately over the heart. It could be felt with the probang, and for this purpose, so as to avoid doing damage, I used a piece of rubber tubing.

Telling the owner there was little chance of successful treatment, I did the only thing that promised success. By means of a rubber tube the dog's stomach was filled with thick "Benger's" food, and then $\frac{1}{36}$ gr. of apomorphine was injected hypodermically. The resulting vomit consisted of blood-stained "Benger's" food but no vestige of the bone. As the dog was obviously in pain it was humanely destroyed, successful surgical interference being out of the question.

AN INTERESTING PARTIAL HYSTERECTOMY.

By GEORGE ELMES, F.R.C.V.S.

St. Albans.

I VENTURE to record the following case as of some interest, particularly on the safety of pituitrin in small patients.

A small Pekingese bitch, $2\frac{1}{2}$ years old, at first time of whelping appeared slightly uneasy, but with no signs of effective labour pains, and 1 c.c. pituitrin was injected. This was followed by slight labour pains, and thirty minutes afterwards another 1 c.c. was injected. With assistance a dead puppy was delivered, and after an interval of an hour another 1 c.c. was injected, another apparently dead puppy being delivered with assistance. This pup appeared quite dead and was dropped into a toilet pail containing cold water, when after a few minutes he was seen to be moving. Artificial respiration and hot-water bottles revived him and he lived for five weeks. On the next day another pup could be felt through the abdominal wall. Three injections of 1 c.c. pituitrin were given at intervals of one hour, but as no signs of labour pains appeared as a sequel an operation was now decided upon. The bitch was given $\frac{1}{8}$ gr. of morphine followed in twenty minutes by chloroform. The left horn, as far as the junction with the body of the uterus, and the left ovary were removed, the puppy within being putrid. Recovery was uneventful except that the skin wound did not heal by first intention.

EXAMINATIONS IN CANADA AND THE UNITED STATES.

To those of our readers who intend to practise in Canada or the United States it is interesting to note that whatever diploma they may hold it is necessary to pass a further test examination. The undermentioned questions were recently set before an English graduate by the Saskatchewan Veterinary Association, it being his desire to settle down in practice as a veterinary surgeon in that province.

Questions set at the Examination of Graduates held at Regina, September 17, 1913:—

ANATOMY.

(1) Name the cranial nerves the functions of which are those of special sense.

(2) Name the openings in the diaphragm, and state what passes through each.

(3) (a) Name the muscles in the posterior tibial group.

(b) Give the origin and insertion of the flexor pedis perforans.

(4) Name the appendages and muscles of the eye.

(5) Describe what forms the circle of Willis. What body does it surround?

PHYSIOLOGY.

(1) Describe the processes involved in the secretion of urine. Illustrate by means of a diagram the particular vessels engaged in the specifications.

(2) Describe what you understand by reflex action.

(3) How is the blood purified? Where and what impurities are removed?

DISEASE AND TREATMENT.

(1) What are the distinguishing symptoms of gastritis, spasmodic colic and enteritis?

(2) How would you arrive at a correct diagnosis and location of the seat of hæmorrhage, whether from the kidneys, bladder or urethra?

(3) Give the causes and treatment of super-purgation, and name three diseases that may result from a severe case.

(4) Give the causes, symptoms and treatment of gastric tympany in the horse.

- (5) Give the pathology of Johne's disease.
 - (a) How would you confirm your diagnosis?
 - (b) Why might Johne's disease be mistaken for tuberculosis?

SURGERY.

- (1) (a) Describe Bier's hyperæmia treatment.
 - (b) Name five actions that may be obtained from this method of treatment.
- (2) Give the causes, symptoms, prognosis, and treatment of sternal fistula.
- (3) Describe the radical operation for poll evil, and state contra-indications to be considered in this operation.
- (4) Describe the operation of paracentesis thoracis, and state where the vertical boundary for puncture lies in the horse, ox, swine and carnivora.
- (5) How would you treat a case of purulent inflammation of the sub-coronary connective tissue?

CONTAGIOUS DISEASES.

- (1) If an outbreak of anthrax occurred in your district, state how you would proceed.
- (2) Give the differential symptoms of black leg (so-called symptomatic anthrax) and anthrax. What are the causes of each disease?
- (3) How is mallein prepared? Describe the mallein test.
- (4) Describe variola vaccinia. What is the prophylactic value of this disease?

SANITARY SCIENCE.

- (1) Describe a suitable and reliable system of ventilation for installation in a horse-barn.
- (2) Mention in detail the regulations necessary for a city or town to enforce, in order to ensure that the milk supply is fit for human food.
- (3) Describe the various grades of market milk.

MATERIA MEDICA.

- (1) Name the appropriate antidotes for carbolic acid, opium, strychnine, Paris green and phosphorus.
- (2) Name the sodium salts used in veterinary practice and give their action and uses.

Translation.

TUBERCULOSIS IN THE DUCK.

By A. CRETEN.

Chief Laboratory Officer of the French Veterinary Research Service.

(TRANSLATED BY I. S. C.).

OF late years tuberculosis in poultry has been notified at the Central Markets of Paris in an ever-increasing number of cases. This statistical increase may be due to greater exactitude or strictness in the methods of inspection, or instances of the malady may actually have become more numerous through consignments of birds from highly infected areas.

Among infected poultry fowls are always the most numerous and turkeys come next. Then follow guinea-fowls and pheasants in proportionately small numbers; but not a single case of tuberculosis in the goose or duck has been met with, although many *post-mortem* examinations have been made.

Similar statements have already been made by different writers, particularly in the "Proceedings of the Tuberculosis Congress of 1898." For instance, in a paper on "Tuberculous Contagion between Man and the Domestic Animals, and between the Animals themselves," Dr. Dubousquet-Laborderie says: "Among domestic animals the goat and the sheep, the goose and the duck, are those which offer most resistance to the bacillus; although some cases of contagion in goats and sheep have been recorded by Lydin, Koch, Tomassen, and König, I do not know of any account of spontaneous tuberculosis in the goose or duck. Straus, in his book, "*La Tuberculose et son bacille*," mentions an interesting fact, which shows how well these birds can assist the contagion of tuberculosis. The following details are communicated by Dr. Pomsay, of La Boissière, who had occasion to observe an epidemic of tuberculosis in a poultry farm of 600 fowls. Straus made sure that the disease in question was tuberculosis. With the fowls were mixed turkeys, ducks, and geese. Of 92 turkeys, 80 died of tuberculosis, but of 130 ducks and 62 geese drinking the same water, eating the same food, and roosting in the same fowl-house, not a duck or a goose fell ill."

On account of this usual immunity we think it interesting to note the following case of tuberculosis in a duck, for the account of which we are indebted to our colleague, M. Mestre.

The case is that of a mandarin duck, a female, aged 7, which had passed all its youth in an aviary with a drake of the same breed, and had never laid an egg. Adjoining the duck's enclosure there is another containing fowls and pigeons. The proprietor had never known of any illness in his poultry yard. The duck was found dead one morning without having shown any special signs of illness, though it was found to be extremely thin on *post-mortem* examination. On investigating the abdominal cavity the first thing to be noticed was the remarkable appearance of the spleen:

it was the size of a walnut and of a greyish colour, with here and there little granulated swellings of a greenish hue that suggested aspergilosis. Numerous tuberculiform lesions similar to those of avicular tuberculosis were found in the liver. The lungs and kidneys were slightly marked with whitish depressions. Several cervical ganglia were caseous, a purulent arthritis was present in the joint of the right humero-radial, and the marrow of the bones was invaded by numerous yellowish tubercles, the size of which varied from that of a pin's head to that of a pea. Apart from the rather special appearance of the spleen these lesions are those of avicular tuberculosis; every lesion harboured large numbers of bacilli, which were capable of being tested by Ziehl's coloration method.

The histological examination proved that all the impaired organs, wherever situated, presented the same characteristics. The typical lesion at its full development was a follicular structure. Every follicle included two zones, a lymphoid periphery and a central caseous zone. The lymphoid zone was exclusively formed of cells mostly of the conjunctive type, that is to say, the nuclei were comparatively large and of a light colour, containing but little protoplasm; certain of these cells, however, having more abundant protoplasm and a more highly coloured nucleus resembled very nearly the so-called epithelioid cells which occur in bovine tuberculosis. All these cellular elements were contained in a very thin fibrous non-vascular sac, somewhat similar to the outer tissue of lymphatic ganglia. Such a formation justifies the description of lymphoid as applied to this zone.

The central caseous zone was homogeneous, granulous, and filled with numerous eosinophiles when of a small size. When more extended the zone took on a stratified appearance, and seemed to be formed of concentric layers alternately granulous or homogeneous.

Bacilli existed in such quantities that on sections coloured by Ziehl's method they formed accumulations which could be seen by the naked eye. It is interesting to note their distribution in the lesions which have been described.

Right in the centre of the caseum there were no bacilli, only towards the periphery did they abound, and they were evenly disseminated. The bacilli were above all numerous in the cellular zone in contact with the caseum, and they had accumulated greatly in the protoplasm of the most interior lymphoid cells. These cells were so crowded with bacilli that their nuclei were often quite hidden. The tuberculous follicles were usually single, though sometimes they were united within a common lymphoid enclosure. Sometimes their central caseous zone had become confluent.

The commencement of a lesion was characterized by the appearance of a cellular spot on the surface of an organ where the parenchymatous elements became separated and finally disappeared, leaving in their place a more or less regular lymphoid islet, the epithelioid central cells of which enclosed bacilli. In proportion to the spread of the lesion the bacilli increased at the centre, and caseation was produced. In this manner follicles developed and finally arrived at the mature stage which has been described above.

The following experimental inoculations were conducted :—

Two guinea-pigs, inoculated in the peritoneum with $\frac{1}{2}$ c.c. of an emulsion of the spleen lesions, rapidly grew thin in general while their abdomens swelled. When they were slaughtered, at the end of six weeks, in each abdominal cavity there was found a purulent mass the size of a walnut encysted in the middle of the intestinal loops. Several mesenteric ganglions were caseous. The liver and the spleen contained a certain number of translucent tubercles. In these various lesions there were a good many bacilli.

In two guinea-pigs which were inoculated under the skin there was a small local lesion, which disappeared rapidly. It was the same with two guinea-pigs which received a subcutaneous injection of the pus from the guinea-pigs which were inoculated in the peritoneum.

In these latter the lesions showed the ordinary follicular type. The liver and the spleen were filled with microscopic non-caseous follicles, which at several infrequent points became confluent, and constituted grey tubercles that were visible macroscopically.

Cultures made on glycerinated potato produced, after a certain time on the stove, greyish-white, thick and shining colonies similar to those of avicular tuberculosis.

To sum up, because of the macroscopic and microscopic aspects of the lesions, their situations and their wealth of bacilli, combined with the aspect of the cultures and the lack of virulence in the bacilli when transferred to the guinea-pigs, the similarity to avicular tuberculosis may be affirmed. It may reasonably be considered probable that this duck, having less powers of resistance than our indigenous breeds, was infected with tuberculosis by the neighbouring fowls, which must have had the disease, though the owner did not suspect it.

ROYAL COLLEGE OF VETERINARY SURGEONS.

FELLOWSHIP DEGREE.

A MEETING of the Board of Examiners for the Fellowship Degree was held at the College, 10, Red Lion Square, W.C., on Saturday, May 16, 1914. The following is a list of the successful candidates, together with the titles of their respective theses :—

Bagenal Harvey Mellon, "An Account of some Aspects of Disease as it affects the Brain of the Horse."

John Holroyd, "Embryotomy."

Reviews.

The Chemistry of Cattle Feeding and Dairying. By J. Alan Murray. Pp. xii + 343. Longmans, 1914.

This volume will probably admirably fulfil its primary object, which is that of instructing the agricultural student. It is less likely to succeed in utility to the farmer or veterinary practitioner.

The fundamental, chemical and physical basis of effective feeding control are satisfactorily dealt with, and the chapters on milk, its composition, variations and products, are very clear. The general get-up and illustrations are good.

It is the hope of scientific men that a really rational quantitative guide to feeding may be realized, but one must admit that at present much remains to be done.

The prevalent tendency is to treat all classes of food constituents—fat, protein, carbohydrate and fibre—as of equal digestive and nutrient value, and to reduce these components by means of factors to a starch value, which serves as a good basis at least for the calculation of the cash value; but, especially in regard to protein foods, it must be remembered that the value of rations of proteins of different origin and of the same “chemical” value is different, and may be widely different in practice. We are pleased to see recognition of this in the author’s pages where reference is made to the lack of nutritive value of zein of maize, recently studied by Hopkins.

An analytical certificate lumps together all sorts of fat, protein, &c., contained in a given food. Every practical man must have seen such certificates of “food value” attached to an article which a self-respecting cow would not eat, or which is a poison.

Without wishing to appear reactionary, one may say that practical experience is at present, at any rate, the best guide. The man who believes in using the best foods, whose purity and wholesomeness are guaranteed by long experience, is likely to spend a little more, but is sure to lose less in the long run, than the man who believes that a good food, showing an excellent analysis, can be made, advertised and marketed at a price from 20 to 25 per cent. less than the cost of good standard foods.

These remarks are not intended in any sense as a reflection on the present book. One would, however, have liked to see more in it by way of warning as to the possible sophistications and likely dangers of compound foods and of concentrated foods. Whilst it is a certain truth that all vegetable substances can show a good quantitative analysis, it is not true that qualitatively they are equal.

G. D. L.

Cysticercus ovis, the Cause of Tapeworm Cysts in Mutton.

By R. H. Ransom, Chief Zoological Division, Bureau of Animal Industry, Department of Agriculture, Washington.

The author in his pamphlet calls attention to the importance of a systematic examination of carcasses of sheep for cysticerci. The belief that sheep measles is rare has been lately discovered to be quite erroneous in America. During the year 1912, 20,000 sheep carcasses were retained for inspection on account of measles at various abattoirs in the Federation. A life history of the *Cysticercus ovis* is given, and its methods of diagnosis described. Its significance in meat inspection is indicated, and though the parasite is not transmissible to man, it not being identical either in action or form with *C. cellulose*, yet from æsthetic reasons meat containing tapeworm cysts is entirely objectionable.

The important measures against infestation of sheep with *C. ovis* are accentuated. The carcasses of dead sheep on the farm or range should be destroyed by fire, so that they may not be devoured by dogs or wolves, and dogs must be kept free from tapeworms by systematic medicinal treatment (male shield fern capsules and areca nut, and the dog's head kept tied up high, so that he does not throw up the medicine).

The publication concludes with three pages of illustrations of the cysticerci in various stages. Here we note the great value of scientific research, for it is pretty conclusively proved in the pages of this pamphlet that the *C. ovis* is not the same parasite as *C. cellulose*, nor yet is it to be confused with *C. tenuicollis*. In the light of these investigations the German regulations, placing sheep measles in the same category as pork measles, would seem to be unnecessarily stringent.

Meat inspectors should obtain this pamphlet from the Department of Agriculture, Washington, D.C. It appears to be a reprint from the *Journal of Agricultural Research*. G. M.

Spirochæta suis: its Significance as a Pathogenic Organism.

By Walter E. King and George L. Hoffmann.

Any facts relating to the question of the causation of swine fever are at the present time of great interest to veterinarians in all countries in which the disease exists. The history of the bacteriological investigations in this complaint, as, indeed, in the case of all others the causation of which has been ascribed to an invisible virus, is of more than passing interest. From the time of the researches of Salmon and Smith, published in 1885, until 1904, the cause of hog cholera was believed to be the *Bacillus cholerae suis* (*B. suispestifer*). In the latter year de Schweinitz and Dorset showed the typical hog cholera in the United States to be due to a filtrable virus, and this has been confirmed by Hutyra, Uhlenhuth, and others in Europe. King and Hoffmann, as a result of careful researches carried out by them at Detroit, have come to the conclusion that a large spirochæte and numerous

granules previously demonstrated in the blood of pigs suffering from swine fever play an important part in the etiology of the disease. They have, moreover, succeeded in cultivating this organism artificially for several generations and in transmitting the disease to healthy animals by the injection of such cultures.

The work of these authors appears to have been carried out under exceptionally favourable conditions as regards the supply of material, &c., and their findings are worthy of serious consideration by all those who are in contact with outbreaks of disease in this and other countries. Their paper is extremely interesting and instructive, and one cannot help but be impressed by the thoroughness with which the experiments have been carried out. It is quite evident that the authors at no time lost sight of the fact that an invisible virus might be carried through the various cultures, and their efforts to exclude the possibility of infection in experimental animals arising from such a source were marked and apparently attended with successful results.

To preclude the possibility of infection arising from the stables in which these experimental animals were kept normal pigs were allowed to inhabit them and so act as controls. Again, animals which had contracted the experimental disease in a mild form showed marked resistance when brought into contact with hog-cholera pigs.

It is to be hoped that this aspect of the etiology of swine fever will receive serious consideration in this country. The results which have attended legislative measures have not been so successful as to warrant researches such as these being entirely ignored.

J. B. B.

The Rhodesia Agricultural Journal, February, 1914. Edited by the Director of Agriculture, assisted by the Staff of the Agricultural Department. Published bi-monthly. Printed by the Argus P. and P. Co., Ltd., Salisbury, Rhodesia. Price 5s. per annum.

This journal contains much of interest and value to Rhodesian farmers. It is well printed, and the articles in it are varied and well written. The matter of water supply in the province is being State regulated, and for the proper development of agriculture and the best use of the land there is no doubt this is of supreme importance. A bacon factory is to be established at Salisbury, but on modest lines for a commencement, for it is proposed to deal with only fifty pigs per week. Perhaps this is wise if factory operations can be conducted economically, but at present modern factories are dealing with 750 pigs per week. A regular supply of suitable pigs is, however, essential to the success of any bacon factory. Mr. R. C. Simmons has an article on "The Breeding and Feeding of Pigs for Bacon Factory Purposes," and for the most part the article is instructive and reliable. It will be difficult, however, or well-nigh impossible, to produce the best bacon pig on a preponderance of maize feeding, and we are pleased to see that Mr. Simmons advises the use of grain food

and skim milk with it. Maize is cheap and plentiful in Rhodesia, and there will be a tendency to use it too freely as a ration. We are inclined to think that the gestation period in the sow is wrongly stated at 112 days (although we know this is the time given for the sow in breeding tables). We think the true average is nearer 115 days. We are rather surprised to find carrots omitted as a food for bacon pigs (perhaps none are grown in Rhodesia). We do not agree that mangolds, beet, turnips and swedes "are all best cooked." We do not advocate turnips at all as a food for pigs, and mangolds and beet are best given in small quantities, raw and pulped. We have seen many sudden deaths in swine fed on cooked mangolds. The reason for giving them raw is that by cooking the tastiness of the roots declines; but, more important still, the albuminous substance in them becomes less soluble by the digestive juices, and the ferments that aid digestion and exist naturally in the roots are destroyed by boiling. As a safe proposition we think, too, that any roots used in swine feeding should not exceed one-fourth part by weight of the ration. A well-illustrated and well-written article by Rupert W. Jack, F.E.S., is that on the diseases of potatoes and the selection of sound seed. Other subjects touched on are "The Cabbage Web Worm" and "The Production of Pedigree Seed." There is an interesting report of a veterinary conference, at which a resolution was passed advocating the establishment of a serum station in England to immunize stock against red-water and gall sickness previous to exportation and to test animals with tuberculin and mallein. Lectures are being given to farmers and departmental bulletins issued.

G. M.

Some Phenomena involved in the Life History of *Spirochaeta*.

Suis. By Walter E. King and Raymond H. Drake. *Journal of Infectious Diseases*, vol. xiv, No. 2, March, 1914, pp. 246-250.

The authors make a further contribution to the study of the life cycle of *Spirochaeta suis*, the organism which is claimed by them to be intimately connected with the causation of swine fever. A further contribution is promised, which, it is stated, will aid in the elucidation of the problem of the life cycle of spirochaetes in general. Meanwhile the present article deals entirely with some interesting facts concerning some successful attempts which have been made to obtain cultures of *S. suis* from Berkefeld filtrates of infective material. The authors state that "this work was undertaken chiefly for the purpose of securing data bearing on three important points: (1) To determine the correlation between the filtrable virus or ultra-microscopic organism of hog cholera and *S. suis*; (2) to secure pure cultures of the spirochæte; and (3) to determine the importance of the granules assumed to be related to *S. suis*." As is rightly pointed out at the end of the communication no definite conclusions should be drawn from this short series of experiments, but the results appear to furnish one more link in the chain of evidence which tends to show that *S. suis* may play an important part in the etiology of swine fever.

J. B. B.

Union of South Africa Department of Agriculture Report, with Appendices for the period January 1, 1912, to March 31, 1913. Printed by the *Cape Times*, Ltd., Government Printers, Cape Town. Price 9s. 6d.

This Government Blue Book contains the report of the Secretary for Agriculture and those of the varied officials who act in their special capacities for the Department of Agriculture. The report of the Veterinary Division is issued by Mr. C. E. Gray, M.R.C.V.S., and is an interesting record of work done in the Union. Mr. Gray does not consider that South African cattle are unsusceptible to tuberculosis, although with the animals living under far more natural conditions than in this country disease is not common. Nevertheless it exists, and as civilization advances it is likely to spread. Measures are being taken against it, but owing to the lack of interest evinced by stock-owners, and failure to report the disease, repressive work is only carried out inadequately.

Mr. A. W. Shilston, M.R.C.V.S., has performed some valuable research investigations at the laboratories at Pietermaritzburg, and Mr. Wm. Robertson, M.R.C.V.S., has done good work in connection with the Pretoria laboratories in the immunizing of cattle against East Coast fever.

Altogether the Report shows evidence of real life in all the departments of agricultural activity, and perhaps the most interesting and valuable information is given under the heads of co-operation, cotton and tobacco, dairying, farm labour, entomology and live stock. The volume would take many days to review adequately, but it can be heartily recommended to all those who intend to take up residence in South Africa and to get their living out of the land and on the land. G. M.

The Agricultural Journal of the Union of South Africa, December, 1913. Edited by William Macdonald, M.S., Agr. Sc.D. Issued by the Agricultural Department. Printed at the Government Printing Office, Pretoria. Annual subscription outside the Union, 6s. post free. Issued free of charge to residents within the four provinces forming the Union of South Africa.

This is the last issue of the Journal under the editorship of Mr. Macdonald, a man who has conducted the periodical with energy and success for an uninterrupted period of ten years and ten months. In the editorial notes which preface this issue attention is called to a useful and valuable innovation about to be accomplished next year. This will consist of the first complete collection of statistics relating to farming within the Union of South Africa, and thereafter the work will be undertaken annually. Mr. Paul A. van der Byl, M.A., contributes an illustrated article on "The Nature of Fungi, with reference to the Life Histories of Some Important Parasites." The smut and rust of wheat are intelligently discussed in this paper, and their origin is lucidly traced to their admixture with healthy seed at

harvest time, and the part the wind plays in the spread of the spores is mentioned. The question of "Tobacco Warehouse Management" is dealt with in a well-illustrated piece of writing by T. E. Elgin, of Pretoria. The importance of "Soil Investigation" in a country opening up to agriculture is emphasized by Dr. C. F. Juritz, M.A., F.I.C., and the futility of trying to grow produce on unsuitable ground may to some extent be avoided if proper investigation is carried out. The article on "Lucerne" is very welcome, and Mr. H. A. Melle gives a splendid account of it. This paper might be read with advantage by many English farmers, as for an all-round fodder plant for horses, cattle, sheep and pigs, lucerne is hard to beat, but it is a plant that needs wooing in a particular way in order to produce the best results, and Mr. Melle tells how this can be effectively done. Mr. Moore, B.A., of Potchefstroom, contributes a useful paper on "The Wheat Louse," and the Journal closes with some varied and brisk arguments on "The Veld-burning Question" in the shape of controversial letters from readers, followed by "A Report of Fruit Storage Experiments" and "Rural Notes," &c.

The periodical must be doing excellent work in the Union, and we are confident that no intelligent South African farmer will be without it. We wish it long years of success, and we can easily see that the field in which it works is limitless and inexhaustible.

G. M.

The Cornell Veterinarian, January, 1914. Published half-yearly under the auspices of the Alumni Association and Society of Comparative Medicine, New York State Veterinary College, Cornell University, Ithaca, N.Y. Price 50 cents per year.

This is a very interesting periodical. It contains a notice of the opening of the new buildings in connection with the New York State Veterinary College, from which it would appear that interest in veterinary science is keen and funds plentiful. A four years' course is in prospect at this college for the veterinary diploma. Mr. W. B. Switzer, V.S., of Oswego, contributes a well-considered article on "Some Requirements of the Successful Practitioner." To those starting in practice the hints he gives are very valuable, and those who "have arrived" may peruse his homily with profit. His remarks with regard to the "Tom, Dick, and Harry" practitioners in America are quite applicable to the same charlatans here. He opines that one of the first questions calling for answer from those in active practice will be: "Can you cure this patient so it will be all right or serviceable, and how much will it cost?" We have known several good practitioners and successful business men who would answer this question rather differently from the way Mr. Switzer advises. A set rule can hardly be given as to how to reply to it. A keen knowledge of human nature is frequently necessary to answer the query astutely, and a wide knowledge of results to answer it at all profitably. We have known many good clients who never dreamt of asking such a question, and we have known some good men who,

when asked, have replied according as the client was religious or worldly : that "the issues of life and death are in Higher Hands than theirs," or that "veterinarians are but indifferent prophets."

W. L. Williams, of Ithaca, puts before the profession the importance of guarding the milk supply from infection through diseases of the internal generative organs in cattle.

W. E. Muldoon gives a timely and comprehensive essay on "Surgical Anæsthesia."

Mr. R. R. Bolton describes how he relieved "Upward Luxation of the Patella" by anæsthesia with chloroform and repeated flexion and extension of the limb after reduction of the luxation.

The journal closes with alumni and college news, and there are two paragraphs of humorous poetry, bearing on our calling, on its last page. Altogether the publication is very readable, instructive, and progressive.

G. M.

Proceedings of the American Veterinary Medical Association, New York City, September 1 to 5, 1913. Published by Wm. J. Dorman, Philadelphia, U.S.A. Edited by John R. Mohler.

The Fiftieth Annual Meeting of the American Veterinary Medical Association was held in New York City from September 1 to 5, 1913, and the volume of details of the proceedings occupy some 1,084 pages, every paragraph of which contains something of interest.

The American Veterinary Medical Association holds a similar place in America and Canada to the National Veterinary Association of Great Britain, and it would be a very excellent idea for both countries if delegates could annually be sent from the one to the other. The advantage would be mutual, for the American Association would reap the experience of the older country and we on our side would see and understand the enormous field of work in the countries of the Newer World. The absurdity of any narrow-minded policies is at once seen by all who travel, but in no country of the world is it so easily demonstrated as in America.

An English reviewer, in glancing through these *Proceedings*, cannot but at once be struck with the vastness of the work undertaken, the thorough earnestness with which it is carried out, and the enormous field in front. "So much to do, so much undone," the words of Cecil Rhodes, were never more truly applicable than to a subject like this, the advances made by veterinary science in America. To belong to the American Veterinary Association carries with it a status and an honour only permitted to those whose educational attainments have been assured by the college from which they have graduated.

In this work of 1,084 pages, excellently bound and finished off, there are papers on all subjects, a few of the titles of which will explain themselves. In those engaged in pathology we find : "The Production of Artificial Immunity against Tuberculosis," by Gilliland and Marshall ; "Immunization Tests with Glanders Vaccine," by Mohler and Eichhorn ; "Police Measures and Hog Cholera," by

Kersley; "The Value of Abortion as a Diagnostic Agent," by Meyer and Hardenberg; "Cerebrospinal Meningitis," by Kaupp.

For the surgeon no less than three papers are written on Abdominal Surgery, including one by Professor Merrillat. Herniæ, Oophorectomy, Certain Surgical Operations on the Dog, and many other subjects find a place; and for the clinician, in addition to the above, we have such everyday subjects as Hock-joint Lameness, Anæsthesia, Firing, Methods of Clinical Diagnosis of Lameness originating below the fetlock, Artificial Insemination, Veterinary Science from the Country Practitioner's Standpoint, Various Lamenesses, and many other subjects too numerous to mention.

The practical demonstrations of surgical and other things likely to be of interest and benefit to the everyday practitioner are features of inestimable value at all these meetings, and from this point in particular the English National Veterinary Association might take a useful hint.

The List of Members of the Association is a very lengthy and influential one, comprising as it does all the best and most eminent veterinarians in the United States and Canada—truly a proud testimonial to the value of the life-long services of the Honorary President, Dr. Liantard, the distinguished Frenchman, who may truly be said to have been the founder and pioneer of veterinary science in America.

F. H.

German Breeds of Live Stock. (Presented by H. Hauptner, Berlin, N.W. through his English Representatives, A. Favre and Co., 122, Newgate Street, London, E.C.) Issued by the German Agricultural Society; published by the German Agricultural Society, Berlin.

This, one of the official publications of the German Agricultural Society, has been translated into English, and some presentation copies have been sent over here. It is a well-printed, informative book, and contains good accounts of the typical horses, cattle, sheep, and pigs of Germany. There are 106 splendid illustrations of pedigree horses, cattle, sheep, and pigs in the illustrated supplement to the letterpress of the volume. The horses mentioned are the East Prussian, Hanoverian, Oldenburg, East Friesland, Holstein, Schleswig and Rhenish, and in each breed the district the horses inhabit is shortly described, the breeding methods are given, the measures to promote and improve the breed are stated, and the type, appearance, action, use and prices are made plain to the reader. Similar descriptive methods are applied to the cattle, sheep, and pigs. Shorthorns appear to be the only English cattle that are met with in quantity in any part of Germany, and these are chiefly confined to a district in Schleswig-Holstein. Shropshire Down, Hampshire Down, and Oxford Down sheep may be found scattered about in various places, and large white and Berkshire pigs have found homes in many parts of the Fatherland. What strikes a Britisher most in reading the book is the strong support and assistance that the State gives to promote and encourage the breeding industry, and

the scientific way in which valuable statistics are collected and put together.

To the man who wants to gain knowledge of German live stock and methods of managing them, the book can be recommended whole-heartedly. Special praise must be given to H. Hauptner, of Berlin, for putting such a valuable work within reach of English readers.

G. M.

Correspondence.

HUMANE SLAUGHTERING—A BIG STEP FORWARD.

To the Editor of THE VETERINARY JOURNAL.

DEAR SIR,—It does not seem to be fully realized to what extent the adoption of humane methods is now in the hands of the public, nor how the public may exert its influence. During the last year petitions have multiplied, local authorities have asked the central authority for increased powers to enable them to prevent cruelty in slaughtering, and the Local Government Board, in response to these applications, has allowed the following sentences to figure in amended local by-laws :—

“Throughout these by-laws the expression humane killer means an instrument, other than a pole-axe or club, which can be operated mechanically, and which is suitable and sufficient to produce the immediate and effectual stunning of the animals upon which it is used.”

“An occupier of a slaughter-house, &c. . . . shall not proceed to slaughter any animal until the same shall have been effectually stunned by a humane killer.”

The enforcement of by-laws which include these clauses will carry into effect the main object in view—viz., that all animals should be humanely stunned before being slaughtered. Brighton, Cheltenham, Chiswick, Croydon, Hornsey, Plymouth, Romiley (Cheshire), and Southampton are among the localities whose councils are actually engaged in remodelling their by-laws in a sense that would be met by the new clauses. There are other places too numerous to mention here where either public petitions asking for similar reforms are being worked up or the authorities have gone forward on their own initiative.

As every slaughter-house is subject to the control of a municipal corporation, a borough council, an urban district council, or a rural district council, there is now some definite prospect that humane methods of slaughter will be enforced throughout the whole country. This reform, however, very largely depends upon the public. Where there is complete indifference, it can hardly be supposed that the local authorities will show any zeal ; but wherever there is a genuine desire that methods which cause needless suffering and

terror should be replaced by methods which prevent both these evils, the feeling of the district may be expected to find expression through its local councillors.

Further information and advice can be obtained from the Council of Justice to Animals, 21A, Savile Row, Burlington Gardens, W., or from the Royal Society for the Prevention of Cruelty to Animals, 105, Jermyn Street, W.

Stroud, May 27, 1914.

Yours faithfully,
R. O. P. P.

PARLIAMENTARY.

CONTAGIOUS DISEASES OF MAN AND DOMESTIC ANIMALS.

MR. C. BATHURST asked the Chancellor of the Exchequer whether, in connection with the proposed Government subsidy for the institution of pathological laboratories, he would consider the need of research work in connection with contagious diseases, such as anthrax, tuberculosis, glanders, cow-pox, and foot-and-mouth disease, which were common to human beings and domestic animals, and apply a portion of the proposed grant towards the conduct of such research and the greater co-operation of the medical and veterinary professions in the interests of human health.—Mr. Lloyd George said the grants proposed were in respect of laboratories to be used primarily for purposes of expert diagnosis and not of research, but he understood that certain of the subjects mentioned were engaging the attention of the Medical Research Committee.

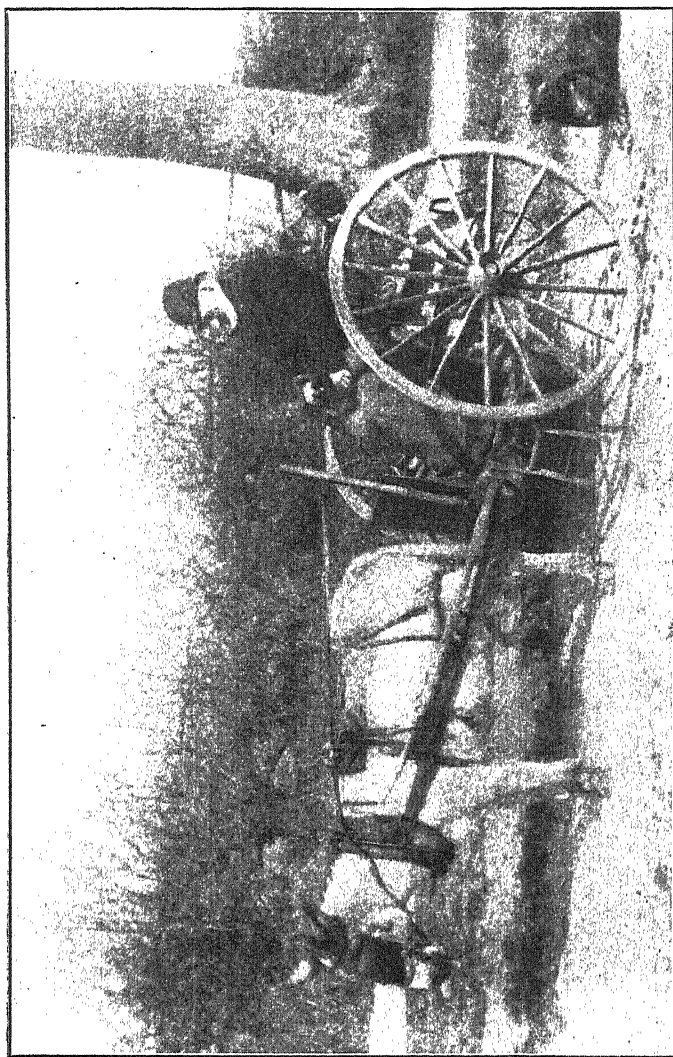
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Illustrations for reproduction should be in good black or dark brown on white paper or card.

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ONE OF A PAST GENERATION.

THE VETERINARY JOURNAL

JULY, 1914.

ONE OF A PAST GENERATION.

A SHORT time ago there died at Ravensthorpe, a village in Northamptonshire, a very old man who had had, in his day, a great reputation as a cow doctor and castrator. He was quite a character in his way, and owed the commencement of his career to association with two brothers, "cow doctors and horse farriers," who used to come into his neighbourhood to attend sick animals when sent for by the farmers. On such occasions it was John Russell's delight if he could obtain permission to accompany and help them, and in this way he picked up some knowledge of the mysteries they practised. When sent for to a sick cow, if he did not recognize the disease his invariable diagnosis was that the beast was suffering from "overflow of the gall," and, as might be expected, he did not lose his chance of a fee by not administering something and paving the way for another visit.

The photograph shows him in the donkey cart which some friends of the old man provided to enable him to get about in his declining years, and his reminiscences of some of the wonderful cures he had effected in his time would almost come up to those which are occasionally related, even to-day, in higher professional circles, when the brethren are collected together.

Editorials.

THE MILK AND DAIRIES BILL, 1914.

THIS Bill, at present before Parliament, probably destined to come into effect on January 1 next, is one of great importance to the veterinary profession, and it is therefore unnecessary for us to offer any apology in discussing the proposals somewhat fully. The Bill, which we publish in full on another page, renders guilty of an offence, any person who

- (a) Sells, or offers or exposes for sale, or suffers to be sold or offered or exposed or sale, for human consumption or for use in the manufacture of products for human consumption ; or
- (b) Uses or suffers to be used in the manufacture of products for human consumption ;

the milk of any cow which has to his knowledge given tuberculous milk, or which is suffering from emaciation due to tuberculosis, or from tuberculosis of the udder, or from acute inflammation of the udder, or from any disease liable to infect or contaminate the milk, unless he proves that he did not know and had no reason to suspect that the milk so sold or offered or exposed for sale or used was the milk of such a cow.

The Bill proposes to empower the Local Government Board to make General and Special Orders for the registration of dairies with local authorities, and for their inspection of persons employed in or about dairies ; for the prevention of the sale for human consumption of infected, contaminated or dirty milk, or the milk of a diseased cow.

Sub-section 3 of Clause 2 places on the Local Government Board the main responsibility for executing the terms of the Act, which shall, however, be done with the concurrence of the Board of Agriculture and Fisheries. We fear that this somewhat ambiguous division of authority between two State Departments may lead to confusion in the future.

One of the first things that must strike the veterinary critic in reading the Bill is the subsidiary position into which the veterinary surgeon is pushed on this primary veterinary subject. It is the Medical Officer of Health of any local authority and not the Veterinary Surgeon, either alone or jointly with the Medical Officer of Health, on whom the Act seeks to place the main responsibility of notification and control. Clause 3, for instance, states that if the Medical Officer of Health of a county or county borough is of

opinion that tuberculosis is caused, or is likely to be caused, through milk supplied from any dairy within his area, then the Act shall have effect, &c. No mention here of the veterinary surgeon even being consulted.

In sub-section 3 of clause 4 we are at last informed that sufficient notice of the time of the inspection must be given to the local authority whose medical officer of health gave the notice, to allow that officer, *or a veterinary inspector or other veterinary surgeon appointed by the authority*, to be present at the inspection if the authority so desire.

Throughout these various clauses, and in fact, throughout the Bill, there runs the settled conviction that those who have drawn the Bill regard the veterinary authority as a mere hewer of wood and a drawer of water for the doctor, even on highly technical matters in which the veterinary surgeon must have a greater and more specialized knowledge. This result in which modern legislation affects our profession is in a large part due, we are bound to say, to the apathy and lack of public spirit shown by members of our profession in impressing our corporate claims on public authorities; and we cannot entirely acquit those high in authority in our profession, both official and non-official, of having contributed to this deplorable state of affairs by their masterly inactivity in the past.

From other points of view the Bill must be regarded as a laudable attempt on the part of the legislature to deal with one of the root causes of the "great white plague."

Clause 7 is of particular interest to our profession. It confers on local authorities the power, and when required by the Local Government Board makes such action compulsory, to appoint, or combine with another local authority in appointing, one or more veterinary inspectors for the purposes of the Act.

Provision is also made to deal with the importation of foreign milk.

We strongly recommend the profession to take the Bill into careful consideration in their own interests. It is another milestone in the rapid march which society is making towards the social control of vital industries, and in that social control our profession will be called upon to take a large and essential part. Whether that part is to be properly recognized and adequately remunerated depends in a large measure on the policy we now pursue with regard to such legislation.

VETERINARY RESEARCH.

A GOOD deal of feeling has lately been aroused on the above subject in regard to whether researches into the diseases of animals should be carried out in purely veterinary laboratories, or whether the collaboration of laboratories connected with medical schools should be sought. That the study of disease should know no distinctions or limits will be admitted on all sides, and whether the cures come from the brains and ideas of a veterinary surgeon, or whether they come from a man who holds a human medical qualification is immaterial, provided it is there and can be practically and serviceably applied.

All these researches, however, cost money, and unfortunately in Great Britain the funds set aside for the purpose are miserably inadequate, so that those who distribute them have to very seriously consider where they shall be placed in order to offer the best prospects of a profitable return.

We of the veterinary profession can allow no argument as to who are the best trained section of the community to deal with the diseases of animals, and as the funds allotted to veterinary research are so small, we are particularly anxious that they shall come to the veterinary laboratories, which, few as they are in number, certainly contain the requisite capacity and technical skill for the proper discharge of the work.

That more veterinary laboratories are needed in which animal researches can be carried out is a fact which everyone admits, and if only the funds necessary for their proper equipment and everyday expenditure could be provided, either by the State or by some generous philanthropist, the profession could at once do the rest by furnishing skilled and properly trained men capable of carrying out researches which would be of inestimable value to the stock-owner and breeder, and indirectly perhaps to the human species, which shares so many diseases in common with animals.

PERSONAL.

WE hear that Mrs. Share-Jones, the wife of the very able Editor of our contemporary, the *Veterinary News*, has just passed her final examination for the degree of LL.B. with first-class honours. We understand she is the first woman to graduate in this country in the faculty of Law. We tender our respectful congratulations to Mrs. Share-Jones on a remarkable academic success.

A BILL TO MAKE BETTER PROVISION WITH RESPECT TO THE SALE OF MILK AND THE REGULATION OF DAIRIES.

BE it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :—

1. If a person—

- (a) Sells or offers or exposes for sale, or suffers to be sold or offered or exposed for sale, for human consumption or for use in the manufacture of products for human consumption ; or
- (b) Uses or suffers to be used in the manufacture of products for human consumption ;

milk of any cow which has to his knowledge given tuberculous milk, or which is suffering from emaciation due to tuberculosis, or from tuberculosis of the udder, or from acute inflammation of the udder, or from any disease liable to infect or contaminate the milk, he shall be guilty of an offence against this Act, unless he proves that he did not know and had no reason to suspect that the milk so sold or offered or exposed for sale or used was the milk of such a cow.

2.—(1) The purposes for which general and special orders with respect to milk and dairies, hereinafter referred to as Milk and Dairies Orders, may be made by the Local Government Board under section thirty-four of the Contagious Diseases (Animals) Act, 1878, as amended by the Contagious Diseases (Animals) Act, 1886, shall include the following purposes :—

- (a) the registration of local authorities of dairies ;
- (b) the inspection of dairies and persons employed in or about dairies ;
- (c) the prevention of the sale for human consumption or for use in the manufacture of products for human consumption, of infected, contaminated, or dirty milk or the milk of a diseased cow ;
- (d) the prohibition of the addition of colouring matter and the prohibition or regulation of the addition of skimmed or separated milk, or water, or any other substance, to milk intended for sale for human consumption, and the prohibition or regulation of the sale for human consumption of milk to which such an addition has been made.
- (e) the regulation of the cooling and conveyance of milk intended for sale for human consumption ;
- (j) the labelling or marking of receptacles of milk for sale for human consumption and the identification of churns and vessels used for the conveyance of such milk.

(2) If any person is guilty of a contravention of or non-compliance with the provisions of any Milk and Dairies Order, he shall be guilty of an offence against this Act.

(3) General Milk and Dairies Orders shall be made by the Local Government Board with the concurrence of the Board of

Agriculture and Fisheries, and shall have effect as if enacted in this Act.

(4) All general Milk and Dairies Orders shall be laid before each House of Parliament as soon as may be after they are made; and if an Address is presented to His Majesty by either House of Parliament within the next subsequent forty days on which that House has sat next after the order is laid before it praying that the order may be annulled, it shall thenceforth be void, but without prejudice to the validity of anything previously done thereunder or to the making of a new order.

The Rules Publication Act, 1893, shall apply to any such order as if it was a statutory rule within the meaning of section one of that Act.

3.—(1) If the medical officer of health of a county or county borough is of opinion that tuberculosis is caused, or is likely to be caused, by the consumption of the milk supplied from any dairy within the county or county borough in which cows are kept, the provisions of the First Schedule to this Act shall have effect with respect to the reports to be made and the steps to be taken with a view to stopping the supply of milk from the dairy, and with a view to stopping such supply orders may be made in accordance with that Schedule, subject to such right of appeal and the payment of compensation in such cases as are provided therein.

(2) Where an order stopping the supply of milk is made under the said Schedule a dairyman shall not be liable for an action for breach of contract if the breach is due to such order.

(3) If any dairyman whilst any order made in accordance with the said Schedule prohibiting the supply or use of milk is in force supplies or uses any milk in contravention of this order he shall be guilty of an offence against this Act.

(4) The Local Government Board may by order direct that the council of any non-county borough within the county, which is a local authority for the purposes of the Diseases of Animals Acts, 1894 to 1911, shall exercise and perform within the borough the powers and duties of the county council under this and the next succeeding section, and where such an order has been made with respect to any non-county borough this and the next succeeding section shall apply as if the borough were a county borough.

4.—(1) If the medical officer of health of any local authority has reason to suspect that tuberculosis is caused, or is likely to be caused, by the consumption of any milk which is being sold or exposed or kept for sale within the area of the local authority he shall endeavour to ascertain the source or sources of supply, and on ascertaining the facts shall forthwith give notice of them to the medical officer of health of the county or county borough in which the cows from which the milk is obtained are kept, whether the dairy where they are kept is within or without the area of the local authority, unless the local authority are themselves the council of that county or county borough.

(2) On the receipt of such notice it shall be the duty of the medical officer of health of the county or county borough to cause the cattle in the dairy, and, where the case so requires, the persons

employed therein, to be inspected, and to make such investigations as may be necessary.

(3) Sufficient notice of the time of the inspection shall be previously given to the local authority whose medical officer of health gave notice, to allow that officer or a veterinary inspector or other veterinary surgeon appointed by the authority being present at the inspection if the authority so desire.

(4) The council of the county or county borough on whose medical officer of health the notice is served shall send to the medical officer of health of the local authority who gave the notice copies of any reports which may have been made by the medical officer of health making the inspection, and of any veterinary or bacteriological reports which may have been furnished to him, and shall give him information as to whether any action has been taken upon those reports and as to the nature of that action.

5.—(1) It shall be lawful for an inspector of the Local Government Board, or the medical officer of health of a local authority, or any person provided with and, if required, exhibiting an authority in writing from such an inspector or from the local authority or medical officer of health, to take for examination samples of milk at any time before it is delivered to the consumer :

Provided that the powers of a medical officer of health and of a person authorized by him or by the local authority under this section shall, except so far as the Local Government Board may otherwise direct, be exercisable only within the area of the local authority.

(2) The result of an analysis or bacteriological examination of a sample of milk taken under this section shall not be admissible as evidence in proceedings under this Act, or in proceedings under the Sale of Food and Drugs Acts, 1875 to 1907, unless the provisions of the last-mentioned Acts which relate to the division of samples into parts are complied with, but if those provisions have been complied with, the result of the analysis shall be available for proceedings under the said Acts (as if it had been procured in accordance with those Acts) as well as for proceedings under this Act.

(3) The medical officer of health or any other officer authorized for the purpose by a local authority within the area of which milk from any dairy situate outside that area is being sold or exposed or kept for sale, may by notice in writing require the medical officer of health or authorized officer of any other local authority to take samples of the milk from that dairy in the course of transit or delivery to premises within the area of the first-mentioned local authority.

(4) Upon receipt of such notice it shall be the duty of the medical officer of health or other authorized officer of the other authority to take samples and to forward, for analysis or bacteriological examination, to the officer who gave the notice a part of any sample so taken, and in taking a sample the officer shall, if so required by the notice, comply with the provisions of the Sale of Food and Drugs Acts, 1875 to 1907, which relate to the division of samples into parts.

The authority requiring the samples to be taken shall be liable to defray any reasonable expenses incurred, the amount whereof shall in default of agreement be settled by the Local Government Board.

For the purpose of the Sale of Food and Drugs Acts, 1875 to 1907, the sample shall be deemed to have been taken by the officer who gave the notice, and proceedings under those Acts may be taken either before a court having jurisdiction within the district for which that officer acts or before a court having jurisdiction in the place where the sample was taken.

6. The provisions of the Sale of Food and Drugs Acts, 1875 to 1907, in reference to the taking of samples of milk, and any proceedings in connection therewith, shall be amended in accordance with the provisions contained in the Second Schedule to this Act.

7.—(1) A local authority may, and when required by the Local Government Board shall, appoint or combine with another local authority in appointing one or more veterinary inspectors or employ for the purposes of this Act and the Milk and Dairies Orders any veterinary inspector appointed under the Diseases of Animals Act, 1894, and any local authority may, and when required by the Local Government Board shall, provide or arrange for the provision of such facilities for bacteriological examinations of milk as may be approved by the Board.

(2) Any order requiring a combination of local authorities for the purposes of this section may provide for all matters incidental to such combination, and in particular how the expenses incurred are to be apportioned.

8. The Local Government Board shall make regulations under the Public Health (Regulations as to Food) Act, 1907, for the prevention of danger arising to public health from the importation of milk intended for sale for human consumption.

9.—(1) The sanitary authority of any district may, with the approval of the Local Government Board, establish and thereafter maintain depôts for the sale of milk specially prepared for consumption by infants under two years of age, and purchase and prepare milk and provide such laboratories, plant, and other things, and exercise and perform such other powers and duties, as may be necessary for the purposes of this section.

(2) The Local Government Board may attach such conditions to their approval as they may deem necessary.

10.—(1) If a local authority fail to fulfil any of their duties under this Act, or under any Milk and Dairies Order, the Local Government Board may after holding a local inquiry make such order as they think necessary or proper for the purpose of compelling the authority to fulfil their duties, and any such order may be enforced by mandamus.

(2) When the authority in default is a district council, the Local Government Board may determine that all or any of the powers of the council under this Act or the Milk and Dairies Orders be transferred to the county council, and those powers shall be transferred accordingly, and section sixty-three of the Local Government Act, 1894, shall apply as if the powers had been transferred under that Act.

11. If any person obstructs any inspector or other officer of the Local Government Board or any medical officer of health, or any veterinary inspector or surgeon, or other officer of or person employed by a local authority, in the execution of his powers under this Act or any Milk and Dairies Order, or fails to give any such officer all reasonable assistance in his power, or to furnish him with any information he may reasonably require, he shall be guilty of an offence against this Act.

12.—(1) The Local Government Board may by order apply for the purposes of this Act the provisions of any public general Act relating to the holding of local inquiries by the Local Government Board, and the expenses of such inquiries, and the powers of the persons holding any such inquiry, and the manner in which notices may be served.

(2) A local authority may delegate to a committee any of their powers or duties (other than the power of raising rates) under the provisions of this Act or of any Milk or Dairies Order, and in such case anything required or authorized by those provisions to be done to or by the local authority may be done to or by the committee to which such powers and duties have been so delegated.

(3) For the purpose of the exercise and performance of their powers and duties by sanitary authorities under this Act and the Milk and Dairies Orders the purposes of this Act and those Orders shall be deemed to be included amongst the purposes of the Public Health Act, 1875, or the Public Health (London) Act, 1891, as the case may require.

(4) Any inspection of cattle made in pursuance of this Act or any Milk and Dairies Order shall be carried out by a veterinary inspector or other properly qualified veterinary surgeon.

13. The expenses of local authorities under this Act and the Milk and Dairies Orders shall be defrayed—

- (a) in the case of a county council, out of the county fund, as expenses for general county purposes, or, if an order of the Local Government Board so directs as respects any such expenses as expenses for special county purposes charged on such part of the county as may be provided by the order ;
- (b) in the case of the common council, out of the general rate ;
- (c) in the case of the council of a metropolitan borough as part of the expenses incurred by the council in the execution of the Public Health (London) Act, 1891 ;
- (d) in the case of the council of a municipal borough or urban or rural district, as part of their general expenses incurred in the execution of the Public Health Acts.

14.—(1) If any person commits an offence against this Act, he shall be liable on summary conviction to a fine not exceeding in the case of a first offence five pounds and in the case of a second or subsequent offence fifty pounds, and if the offence is a continuing offence to a further fine not exceeding forty shillings for each day during which the offence continues.

(2) Proceedings against a dairyman for failure to comply with an order made under the First Schedule to this Act requiring the dairyman not to supply milk from a dairy may be taken before a court of summary jurisdiction either in the place where the offence was committed or in the place where the dairy is situated, and shall be taken only by the authority by which the order was made.

(3) Where the occupier of a dairy is charged with an offence against this Act, he shall be entitled upon information duly laid by him to have any other person whom he charges as the actual offender brought before the court at the time appointed for hearing the charge; and if, after the commission of the offence has been proved, the occupier of the dairy proves to the satisfaction of the court—

(a) that he has used due diligence to enforce the execution of this Act and the Milk and Dairies Orders; and

(b) that the said other person had committed the offence in question without his knowledge, consent or connivance; that other person shall be summarily convicted of the offence, and the occupier shall be exempt from any fine, and the person so convicted shall, in the discretion of the court, be also liable to pay any costs incidental to the proceedings.

(4) When it is made to appear to the satisfaction of the authority by or on whose behalf proceedings are about to be taken—

(a) that the actual occupier of the dairy has used all due diligence to enforce the execution of this Act and the Milk and Dairies Orders; and

(b) by what person the offence has been committed; and

(c) that it has been committed without the knowledge, consent, or connivance of the occupier of the dairy and in contravention of his orders;

proceedings shall be taken against the person who is believed to be the actual offender without first proceeding against the occupier of the dairy.

(5) It shall be the duty of the local authority to take proceedings for enforcing the provisions of this Act and of Milk and Dairies Orders, and the clerk of the local authority or other officer whom the local authority may appoint shall have power, if so authorized by the local authority, to institute and carry on such proceedings.

(6) All fines imposed in any proceedings instituted by or on behalf of a local authority in the exercise of their powers and duties under this Act shall be paid to the authority and carried to the credit of the fund out of which the expenses incurred by the authority under this Act are defrayed.

15.—(1) In this Act and in the Contagious Diseases (Animals) Act, 1878, and the Contagious Diseases (Animals) Act, 1886, unless the context otherwise requires—

The expression "dairy" includes any farm, farmhouse, cowshed, milk store, milk shop, or other place from which milk is supplied on or for sale or in which for purposes of sale or manufacture into butter, cheese, dried milk or condensed milk for sale, milk is kept or used, and, in the case of a purveyor of

milk who does not occupy any premises for the sale of milk, includes the place where he keeps the vessels used by him for the sale of milk, but does not include a shop from which milk is not supplied otherwise than in the closed receptacles in which it was delivered to the shop, or a shop or other place in which milk is sold for consumption on the premises only ;

The expression "milk" includes cream, skimmed milk, and separated milk ;

The expression "dairyman" includes any occupier of a dairy, cowkeeper, or purveyor of milk ;

The expression "purveyor of milk" includes a seller of milk, whether wholesale or by retail ;

The expression "medical officer of health" includes any duly qualified medical practitioner authorized by the council to act on behalf of the medical officer of health ;

The expression "veterinary inspector" means an inspector being a member of the Royal College of Veterinary Surgeons, or having such other qualifications as may be approved by the Board of Agriculture and Fisheries ;

The expression "sanitary authority" as respects London means the sanitary authority for the purposes of the Public Health (London) Act, 1891, and elsewhere the council of a borough or of an urban or rural district, and the expression "sanitary district" means the district of such authority ;

The expression "common council" means the mayor, aldermen, and commons of the City of London in common council assembled.

(2) Where milk is sold or exposed or kept for sale it shall be presumed to be sold or exposed or kept for sale for human consumption or for use in the manufacture of products for human consumption, unless the contrary is proved.

(3) Where milk is kept in any dairy, or in the custody or possession of any dairyman, it shall be presumed to be kept for purposes of sale, or manufacture for sale, unless the contrary is proved.

(4) The expression "local authority" in section nine of the Contagious Diseases (Animals) Act, 1886, and in this Act shall include sanitary authorities and county councils, and the Local Government Board may by order determine which of the powers and duties conferred and imposed on local authorities by Milk and Dairies Orders or this Act are to be exercised and performed by sanitary authorities and which by county councils, or may determine as respects any such powers and duties that they shall be performed by the local authorities for the purpose of the Diseases of Animals Acts, 1894 to 1911, and the order may provide for the giving of assistance and information by any one such authority to any other such authority in carrying out such powers and duties, for determining the officers of local authorities by whom the several powers and duties are to be carried out, and for making such adaptations of the provisions of section nine of the Contagious Diseases (Animals) Act, 1886, as may be necessary to make them applicable to any such authorities.

(5) The Scilly Islands shall be deemed to be a county and the council of those Islands the council of a county, and any expenses incurred by that council under this Act or the Milk and Dairies Orders shall be treated as general expenses of the council.

16.—(1) Section fifty-three of the Public Health Acts Amendment Act, 1907 (which confers power to require dairymen to furnish lists of sources of supply), shall apply to London as if it were herein re-enacted with the substitution of references to sanitary authorities and districts of sanitary authorities, for references to local authorities and the districts of local authorities, and any penalties imposed by the said section as so applied shall be recoverable summarily.

(2) Any provisions of the Public Health Act, 1875, applied by this Act shall, for the purposes for which they are so applied, extend to London, subject to necessary adaptations.

(3) Section thirty-four of the Contagious Diseases (Animals) Act, 1878, as amended by section nine of the Contagious Diseases (Animals) Act, 1886, and this Act shall, notwithstanding anything in the Public Health (London) Act, 1891, extend to London.

17.—(1) This Act may be cited as the Milk and Dairies Act, 1914, and shall come into operation on the first day of January, nineteen hundred and fifteen or such later date, not being later than the first day of October, nineteen hundred and fifteen, as the Local Government Board may by order appoint.

(2) This Act shall not extend to Scotland or Ireland.

(3) The enactments specified in the Third Schedule to this Act are hereby repealed to the extent mentioned in the third column of that Schedule, and there shall also be repealed, as from the expiration of one year after the commencement of this Act, so much of any local Act as deals with any of the matters dealt with by any of the provisions of this Act.

SCHEDULES.

FIRST SCHEDULE.

Procedure for Stopping Supply of Milk under Section 3.

(1) The medical officer of health of the county or county borough shall report the matter to the council of the county or county borough (hereinafter referred to as the responsible authority).

(2) His report shall be accompanied by the veterinary or bacteriological reports which have been furnished to him.

(3) On the receipt of the report or a copy of the report from the medical officer of health, the responsible authority may serve on the dairyman notice to appear before them, or furnish an explanation in writing, within such time not less than forty-eight hours from the time of the service of the notice on him as may be specified in the notice, to show cause why such an order as is hereinafter mentioned should not be made.

(4) The notice shall be accompanied by a copy of the reports made in respect of the dairy.

(5) The responsible authority if, in their opinion, the dairyman has failed to show cause why an order should not be made, may make an order prohibiting him, either absolutely or unless such conditions as may be prescribed in the order are complied with, from supplying for human consumption, or using or supplying for use in the manufacture of products for human consumption, any milk from the dairy until the order has been withdrawn in accordance with the provisions of this Schedule.

(6) The order shall specify the grounds on which it is made.

(7) On the making of such an order, a copy of the order shall forthwith be served on the dairyman, and notice of the facts shall also be served on the Local Government Board and the Board of Agriculture and Fisheries.

(8) Where no order is made, the responsible authority shall allow the dairyman any reasonable expenses incurred by him in showing cause why the order should not be made.

(9) An order prohibiting the supply or use of milk made under this Schedule shall forthwith be withdrawn, and notice of withdrawal served on the dairyman as soon as may be after the responsible authority or their medical officer of health is satisfied that the milk supplied from the dairy is not likely to cause disease.

(10) The medical officer of health shall have power to withdraw an order if so authorized by the responsible authority.

(11) If a dairyman is aggrieved by the making or continuance of an order prohibiting the supply or use of milk, he may by complaint under the Summary Jurisdiction Acts appeal to a court of summary jurisdiction.

(12) A court of summary jurisdiction on such appeal may confirm, vary, or withdraw the order and may direct to and by whom the costs of the appeal are to be paid.

(13) Pending the determination of the appeal, an order shall remain in force unless previously withdrawn.

(14) If an order prohibiting the supply or use of milk is made under this Schedule without due cause, or if a responsible authority or medical officer of health unreasonably neglect or refuse to withdraw any such order, any dairyman, if not himself in default, shall be entitled to recover from the responsible authority full compensation for any damage or loss which he may have sustained by reason of the making of the order or of the neglect or refusal to withdraw the order.

(15) In the case of an appeal under this Schedule being allowed, the court to which the appeal is made shall determine and state whether the order, the subject of appeal, has been made without due cause or the withdrawal has been unreasonably neglected or refused, and whether the dairyman has been in default.

(16) Any dispute as to the fact of damage or loss or as to the amount of compensation shall be settled by arbitration in the same manner as provided by the Public Health Act, 1875, and any sum awarded as compensation shall be recoverable as a civil debt.

(17) If the compensation claimed does not exceed twenty pounds it may at the option of either party instead of being settled as hereinbefore provided be settled by and recoverable before a court of summary jurisdiction.

SECOND SCHEDULE.

Amendment of Sale of Food and Drugs Acts.

(1) Where, under the Sale of Food and Drugs Acts, 1875 to 1907, a sample of milk is procured from a purveyor of milk, he shall, on being required to do so by the person by whom or on whose behalf the sample was taken, state the name and address of the seller or consignor from whom he received the milk.

(2) The local authority in whose district the sample was taken may take or cause to be taken in accordance with the provisions of the Sale of Food and Drugs Acts, 1875 to 1907, relating to the procuring of samples, at the place of delivery, of milk in course of delivery, one or more samples of milk in course of transit or delivery from the seller or consignor.

Notice of intention to take proceedings under the Sale of Food and Drugs Acts, 1875 to 1907, against the purveyor shall be served upon him within four days after the sample of milk was procured from him, and the purveyor may within twenty-four hours of the service of such notice serve on the local authority a notice requiring them to procure a sample of milk from the seller or consignor in the course of transit or delivery to the purveyor, unless a sample has been so taken since the sample was procured from the purveyor; and where the purveyor has not served such notice as aforesaid, he shall not be entitled to plead warranty as a defence in any such proceedings:

Provided that the purveyor shall not have any such right to require that such a sample shall be taken in cases where the milk from which the sample procured from the purveyor was taken was a mixture of milk obtained by the purveyor from more than one seller or consignor.

(3) Any sample of milk so taken in the course of transit or delivery shall be submitted for analysis to the analyst to whom the sample procured from the purveyor is or was submitted.

(4) If proceedings are taken against the purveyor of milk, a copy of the certificate of the result of the analysis of every sample so taken in the course of transit or delivery shall be furnished to the purveyor, and every such certificate shall, subject to the provisions of section twenty-one of the Sale of Food and Drugs Act, 1875, be sufficient evidence of the facts stated therein, and shall be admissible as evidence on any question whether the milk sold by the purveyor was sold in the same state as he purchased it.

(5) The local authority of the district in which the first-mentioned sample was taken may, instead of, or in addition to taking proceedings against the purveyor of milk, take proceedings against the seller or consignor.

(6) In any case in which it is proposed to take proceedings under the Sale of Food and Drugs Acts, 1875 to 1907, against the owner of cows in respect of a sample of milk of such cows taken in course of transit or delivery, notice of the intention to take such proceedings shall be served upon the owner within four days after the sample is taken, and the owner may within twenty-four hours of the service of such notice serve on the local authority a notice requiring them to procure a sample of milk from

the corresponding milking from the dairy in which the cows are kept, and the foregoing provisions shall apply to such sample :

Provided that the person taking the sample of milk from the dairy shall be empowered to take such steps at the dairy as may be necessary to satisfy him that the sample obtained from the dairy is a fair sample of the milk which the dairy herd at that dairy yields when properly and fully milked.

ANNUAL REPORT OF THE BROWN ANIMAL SANATORY INSTITUTION COMMITTEE.

THE Annual Report of the Superintendent of the Brown Animal Sanatory Institution for 1913 has been presented by the Committee of Management. From this it appears that during the year the total number of examinations of animals made was 7,036, and the total number of animals brought to the Institution was 6,022, of which 565 were in-patients at the Hospital. Animals under treatment included 3,956 dogs, 1,355 cats and 535 horses, the commonest diseases being distemper, mange and scabies in dogs and lameness in horses. It was estimated that 400 animals were sent away to veterinary surgeons, treatment being refused on the grounds that the owners could afford to pay the proper fees. Of the 565 in-patients, 520 were cured or relieved, 17 died, and 28 were destroyed as incurable.

The five Lectures required under the will of the late Mr. Brown were delivered during December by the Superintendent, Mr. F. W. Twort, M.R.C.S., L.R.C.P., in the Theatre of the Royal College of Surgeons. The subject of the Lectures was "The Cultivation of Animal and Vegetable Micro-organisms."

Many bacteriological and pathological examinations have been made in the laboratories on materials obtained from the Hospital during the year.

The following investigations have also been carried out in the laboratories by different workers :—

Mr. W. Edmunds : (1) The functions of the thyroid and parathyroid glands.

Prof. T. Hewlett and Dr. J. A. Shaw-Mackenzie : (2) Serum tests for malignant growths.

Dr. C. C. Twort (Beit Memorial Fellow) : (3) Production of Johne's disease in rodents ; (4) *Coccidium oviforme* and *Coccidium bovis* ; (5) The rapidity with which lymphatic glands become infected ; (6) Immunity in tubercular disease.

The Superintendent : (7) The cultivation of the *lepra bacillus*.

Mr. Ingram and the Superintendent : (8) Johne's disease of cattle.

Dr. E. Mellanby and the Superintendent : (9) Infantile diarrhoea.

Dr. C. C. Twort and the Superintendent : (10) The nature of certain filter-passing micro-organisms.

General Articles.

VACCINE THERAPY IN ROUTINE PRACTICE.

By WM. SCOTT, F.R.C.V.S., F.R.M.S.

Consulting Veterinary Surgeon for the County of Somerset.

In recording the following cases I have selected them as being more or less typical of the diseased conditions one usually sees in general practice. The diverse nature and characteristics of the cases thus selected indicate the wide range over which vaccine therapy may be applied, and that the reader may form a fair idea of the relative value of the treatment by vaccines I have added at the end of each record my percentage of recoveries.

I.—INFECTIVE WOUNDS.

Including fistula of the poll, withers, sternum, croup, rectum, anus, and accidental injuries.

Subject.—A nine-year-old cart mare, due to foal in four months, showing a deep punctured wound in the right groin. The wound extended to the tunica abdominalis, and as the animal was very fat the depth was very considerable, which, when seen by me, was aggravated by considerable swelling. The injury was supposed to have been caused by the horn of a bull. The wound was comparatively dry and *not discharging*, a very significant omen, as it clearly indicated if the wound was infected by pathogenic bacteria they were having all their own way, inasmuch as the bacteriotropic elements were not pouring through. With due precautions scrapings were taken from the wound for future cultural purposes. Being unprepared first aid treatment of the wound was carried out, irrigation with salt and water, curetting and plugging the cavity with lint soaked in ol. tereb. and salad oil. The mare was feeding but her temperature was 104.2° F. The swelling extended from the wound under the abdomen to the chest.

At the 24th hour the temperature was 105.3° F. The cellular effusion had extended to the fore legs and the animal walked with difficulty.

At the 48th hour the temperature was 105° F., and the swelling about the same, but the wound was discharging a little. A vaccine having been prepared, the causative bacteria being *Bacillus coli*

and *Streptococci*; the chains of the latter were very short—*Streptococcus brevis*—in fact many appeared as diplococci. Dose.—*B. coli*, 500,000,000; streptococci, 350,000,000.

At the 72nd hour the temperature was 103.4° F. The swelling was slightly smaller, but the wound was now discharging freely a thick "healthy" pus—"laudable pus."

At the 96th hour the swelling had receded considerably and was less tense. The temperature registered 102.3° F.

At the 126th hour a further injection of vaccine was administered: *B. coli*, 1,000,000,000; streptococci, 500,000,000. The swelling now was considerably reduced, the patient could walk with freedom. The temperature was 102.1° F.

At the 220th hour another injection was given: *B. coli*, 500,000,000; streptococci, 350,000,000. The wound healed well; it was not sutured, and a drainage tube was inserted. The swelling gradually disappeared and the recovery was complete. The only medicinal treatment consisted of the internal administration of citric acid and occasional doses of ol. tereb. The wound was irrigated with soda cit. and ac. boric.

Number of cases treated by autogenous vaccine, 49; recoveries, 47. One case was infected by the bacillus of malignant œdema and died; one case had recovered from septic arthritis, finally developed *acute* tetanus and died in forty-eight hours.

Causative bacteria:

- Staphylococci with *B. coli*, 21 cases;
- B. pyocyaneus* with staphylococci, 4 cases;
- B. coli communis*, 4 cases;
- B. coli communis* with staphylococci, 11 cases;
- B. coli* with staphylococci, 3 cases;
- Staphylococci, 3 cases;
- Streptococci, 2 cases;
- Bacillus of malignant œdema, 1 case.

II.—PNEUMONIA.

Subject.—An aged cart mare, had been coughing for three or four days previous to my seeing her. On my first visit typical symptoms of pneumonia were established and a stock *polyvalent* vaccine was administered forthwith. There was slight bilateral nasal discharge and running at the eyes. Temperature, 104.3° F.; respiration 62 per minute, and somewhat laboured; pulse 82; visible membranes

slightly cynotic. Lung puncture was performed and 10 c.c. sterile nutrient broth injected into the parenchyma and a serosanguineous material aspirated. From this, nutrient tubes were inoculated and incubated and long chained streptococci (*S. longus*) and diplococci isolated.

At the 38th hour an autogenous dose was injected : Streptococci, 250,000,000 ; diplococci, 250,000,000.

At the 64th hour the temperature was 104.1° F. ; respiration 58 per minute ; pulse 97.

At the 86th hour the mare had eaten some green food and looked brighter. Pulse 82 ; respiration 47 ; temperature 103° F.

At the 116th hour, pulse 80 ; respiration 43 ; temperature 103.1° F. A further injection was given : Streptococci, 450,000,000 ; diplococci, 450,000,000.

At the 140th hour considerable general improvement was noticed. Pulse 71 ; respiration 35 ; temperature 102.4° F.

At the 163rd hour the patient had lain down and rested about two hours. Pulse 62 ; respiration 30 : temperature 101.4° F.

At the 215th hour patient much better, both focal and general. Pulse 60 ; respiration 27 ; temperature 102° F. Another lung puncture was performed and cultures duly made on agar and blood agar and several colonies examined. No diplococci were detected, only streptococcal chains, but it is interesting to note the cocci were somewhat flattened, stained irregularly and appeared smaller altogether. A final injection of 750,000,000 streptococci was given. Progress was quite satisfactory, the animal was turned out to grass for a month, after which she was put to work.

Number of cases treated by autogenous vaccine, 14 ; recoveries, 12. One case developed gangrene (pulmonary) and died ; one case had hydrothorax complications and died.

Causative bacteria :

- Cocci bacillus with streptococci, 5 cases ;
- Cocci bacillus, streptococci and diplococci, 2 cases ;
- Diplococci with cocci bacillus, 2 cases ;
- Streptococci and staphylococci, 1 case ;
- Streptococci and diplococci, 4 cases.

III.—BRONCHITIS.

Subject.—An aged vanner, subject to slight "*broken wind*" of long standing. Had an influenzal cold for some days which had gone through the whole stable. The cough was very "croupy ; charac-

teristic respiratory crepitus and wheezing could be detected, and a copious nasal discharge. Pulse 64 ; respiration 42 ; temperature 104.1° F. Lung puncture was practised. The bacteria identified were *Streptococcus longus*, *Staphylococcus albus* and a coccus (Gram negative) apparently of the "*Micrococcus catarrhalis*" group.

At the 36th hour a vaccine was administered : Streptococci, 250,000,000 ; staphylococci, 500,000,000 ; *M. catarrhalis*, 300,000,000. A scarcely perceptible reaction followed.

At the 60th hour the following was given : Streptococci, 500,000,000 ; staphylococci, 750,000,000 ; *M. catarrhalis*, 500,000,000.

At the 86th hour the patient had a most distressing cough ; copious discharge from both nostrils. Pulse 59 ; respiration 38 ; temperature 104° F.

At the 110th hour cough not so persistent. Respiratory murmurs more normal. Pulse 60 ; respiration 29 ; temperature 102° F.

At the 112th hour patient about the same ; focal and general.

At the 130th hour condition stationary.

At the 150th hour about the same. Gave : Streptococci, 750,000,000 ; staphylococci, 1,000,000,000 ; *M. catarrhalis*, 750,000,000.

At the 180th hour pulse 53 ; respiration 22 ; temperature 101.4° F. Lungs clearing very well. Patient bright and feeding. Bowels somewhat constipated. Order, 1 pint linseed oil and 10 ozs. medicinal paraffin.

At the 220th hour progress very satisfactory.

At the 275th hour no nasal discharge, very little cough, appetite good. Pulse, respiration and temperature about normal. Gave : Streptococci, 300,000,000 ; staphylococci, 300,000,000 ; *M. catarrhalis*, 250,000,000. No further treatment was adopted and the patient was discharged three days later.

It is interesting to note the emphysematous symptoms have nearly disappeared, but, of course, I cannot go further than say this salutary condition MAY be due to the vaccine course. I may, however, add I am at present treating two cases of broken wind with vaccines, having grown bacteria from material taken from their lungs. These I will report upon later.

Number of cases treated by autogenous vaccine, 6 ; recoveries, 6.

Causative bacteria : Streptococci, staphylococci, *M. catarrhalis*, 3 cases ; Cocci bacillus (*Pasteurella*) with staphylococci, 1 case ; Cocci bacillus (*Pasteurella*) with streptococci with *M. catarrhalis*, 2 cases.

IV.—SUBACUTE NEPHRITIS.

Subject.—An aged hunter mare, seen in consultation with Mr. Langford, M.R.C.V.S., of Shaftesbury, which was first noticed going stiffly after a good run with the Blackmore Vale Foxhounds. The description of the symptoms as given by the owner and his attendants were so conflicting and confusing as to offer little assistance to the expert. When seen by us, however, the symptoms clearly suggested kidney affection. A sample of urine was procured with the usual precautions, and microscopical examination after centrifugalizing revealed numerous crystals, a few red blood cells, epithelial cells and actively motile bacilli. On testing the urine faint traces of albumin could be detected and the reaction was strongly acid. Agar tubes inoculated produced well-developed colonies which proved to be those of *B. coli*. A vaccine was made and five ampoules despatched to Mr. Langford, who kindly undertook the administration of them, the first dose being composed of 500,000,000 *B. coli*, each successive dose increasing a quarter of a million. The injections were given every five or six days. Six weeks later Mr. Langford sent the following report: "The mare is much better and save for a slight crossing of the legs appears all right." A sample of urine was received at this date which was normal, except for an excess of crystals. There were no cells and no bacteria detected. I may mention the first sample of urine sent was very cloudy in appearance, thick in consistence, in fact looked like rancid oil.

Number of cases treated by autogenous vaccine, 9; recoveries, 8.

Causative bacteria:

B. coli communis, 4 cases;

B. coli with streptococci, 3 cases;

B. coli and *B. pseudo-diphtheria*, 1 case;

*Streptococcus and staphylococcus, 1 case.

V.—CHRONIC CYSTITIS.

Subject.—A six-year-old mare, which was recently purchased by a client and shortly after which he found was suffering from the continual discharge of urine (incontinence). When seen by me the urine was dribbling away at intervals down the perineum and both hind legs with consequent excoriation of the parts. The urine gave a strongly acid reaction and contained a great profusion of epithelial cells. By using a vaginal speculum and dilating the meatus urinarius with a pair of long forceps to permit the entrance of a small electric

* This case was diagnosed as pyelo-nephritis and proved fatal.

torch I was enabled to observe the state of the cystic mucosæ. The membranes presented an irregular corrugated appearance and were of a dirty reddish-grey colour. At intervals capillary blood-vessels stood out somewhat prominently. The capacity of the organ was much diminished ; in fact, the mucous surface was so shrunk as to prevent any distension of the organ at all. A sample of urine was removed under sterile precautions, *i.e.*, the insertion of a vaginal speculum previously boiled, painting the meatus with tincture of iodine and re-painting, after which a long sterile metal cannula was passed into the bladder, while the other end of the cannula reached into a sterile test tube. About 1 c.c. each of this fluid was poured into an agar, blood agar and gelatine tube and allowed to flow freely all over the surface of the media, taking care, of course, it did not come in touch with the cotton plug. These tubes were then incubated in the *upright position*, the first two at 37° C., the last at room temperature. Pure cultures developed, which eventually proved to be streptococcal colonies. The coccus belonged to the *longus* group apparently. It may also be interesting to note the cocci appeared to possess very slight adhesive affinity in chains. Excessive mixing of the colonies collected on a platinum loop with the globule of water placed upon the slide broke up these chains with evident ease and the slightest shaking of the bacterial emulsion in the sealed test tube prior to standardization effectually produced a field of single cocci for the bacterial count. In the case of the strangles streptococcus the converse to this is the rule. Six ampoules were supplied, the first dose containing 500,000,000 streptococci ; the second dose, 750,000,000 ; the third dose, 1,000,000,000 ; the fourth dose, 1,250,000,000 ; the fifth dose, 1,000,000,000 ; the sixth dose, 500,000,000. The interval between each dose varied from five to seven days. In two months, dated from the time of the first injection, the net results were as follows : The patient had considerably improved in condition, the incontinence of urine had greatly diminished, but there were still occasional irregular emissions, not sufficient, however, to cause cutaneous excoriations, and the ordinary observer noticed nothing amiss when micturating. A careful examination of the urine, as well as biological testing, forced me to conclude streptococci were no longer present. The bladder itself, however, appeared to still possess a limited capacity, although the mucosæ were not quite so corrugated. The sphincter of the meatus was still very relaxed and I fear always will be. Later I propose stretching the walls of the

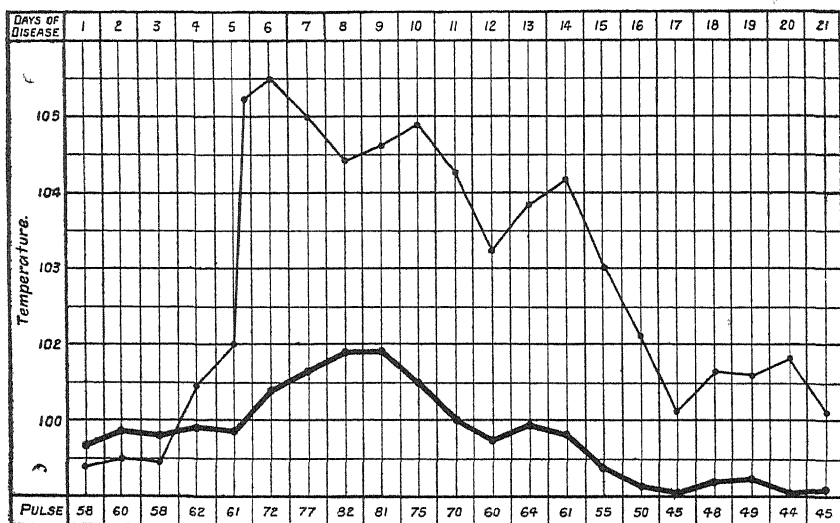
viscus to increase its capacity so that less continual pressure may be exerted upon the sphincter itself.

Number of cases treated by autogenous vaccines, 2 ; one cured, one much improved.

Causative bacteria : Streptococcus, 1 case ; B. coli with streptococcus, 1 case.

VI.—STRANGLES OF THE IRREGULAR TYPE.

Subject.—Cart gelding (aged) in a stable where strangles had affected the occupants for some weeks. A sub-maxillary abscess formed. This was followed by a postpharyngeal abscess, œdema of



Temperature and pulse chart.

the lips, nose, chest, abdomen and hind legs, simulating purpura hæmorrhagica, but membranous petechiæ were not visible and later poll evil developed from which cultures of pure streptococci were obtained. When first seen the case was treated on ordinary orthodox lines, fomentation, lancing abscess, irrigating cavity and simple medicinal remedies.

At the 120th hour a stock vaccine of : Streptococci, 500,000,000 ; staphylococci, 750,000,000.

At the 192nd hour an autogenous dose was injected : Streptococci, 500,000,000.

At the 288th hour : Streptococci, 700,000,000.

At the 408th hour : Streptococci, 500,000,000.

This case being a very typical one of "irregular" strangles I give an epitome here, the full report appearing in the *Veterinary News* of May 2, 1914.

The special interest in this case appears to me to be the fact it started with a pure streptococcal invasion and ended as such. I may also draw attention to the fact that there was less pronounced sub-cellular infiltration, which I believe the vaccines were the means of preventing the merging into an organized purpura hæmorrhagica.

Number of cases treated by autogenous vaccine, 7 ; recoveries, 5.

Causative bacteria : Streptococci with staphylococci, 5 cases ; streptococci, 1 case ; streptococci, *B. coli* with staphylococci, 1 case.

One case developed empyæma and died. One case developed mesenteric abscess and died.

VII.—ULCERATIVE KERATITIS.

Subject.—A Great Dane, weighing 138 lb., age $2\frac{1}{2}$ years, and reported never to have had distemper. When first seen the left eye was greatly inflamed, the eyelid almost persistently closed and a slight muco-purulent discharge was present. The right eye was a trifle dull. The exact pathological conditions at this stage were acute conjunctivitis, diffused keratitis and a spreading corneal ulcer situated away from the direct line of vision and near the outer canthus. The cornea was exceedingly cloudy throughout and radiating from the ulcer stood out in bold relief prominently gorged blood-vessels. This eye was functionless. The usual treatment was adopted, bathing with weak boric water and dropping a collyrium of atropin with zinc sulph. into the eye at intervals. I may add a leech was also applied at the outset. The patient was kept in the dark throughout.

NOTE.—I have no definite record of strangles running a regular course where vaccine therapy was practised, but they must be well over thirty and possess no special interest.—W. S.

A week of this treatment gave no benefit ; in fact, the eye appeared on the whole worse. For the next week we irrigated the eye with iodine water (weak) and used ophthalmic discs and insufflation of hydrargyrum subchlor. instead of lotion. This also failed to give any relief. The ulcer had spread a little more, but the cornea was perhaps slightly less opaque. I now began to fear the loss of the eyesight and conveyed my views to the owner, with the result

the patient was despatched to my surgery. The eye was irrigated with sterile iodine water and bound up with boric lint swabs to remove the risk of alien bacterial contamination. This was repeated three times on the day of admission and on the evening of the same day a sterile platinum loop was drawn firmly along the surface of the ulcer and nutrient tubes inoculated. In due course colonies formed. These proved to be pure *Staphylococcus albus*. A vaccine from this bacterium was made forthwith and a dose of 250,000,000 staphylococci administered. The negative phase was very slight, although there was considerable increase in the focal discharge. Local treatment from this date consisted of cold water irrigation from a hose-pipe for fifteen minutes three times a day—the procedure being a fair amount of water force was driven between the eyelids for four or five minutes, an interval of rest allowed of one to two minutes, the irrigation repeated and the same process gone over again. In this manner I believe greater benefit can be derived than from a continual low temperature of fifteen or twenty minutes. The therapeutics of cold water application as it appears to me is, first, as a vaso-constrictor and consequent upon the low temperature, a bacterial depressor. Removal of the cold water causes an increased flow of blood to the parts, so that the reaction is, second, as a vaso-dilator. Cause these two functions to be brought into play one after the other and a better local tone must be restored with the consequent increase of the bacteriotropic elements directed to the diseased parts. To further supplement the determination of Nature's fighting antibodies to the diseased parts after each irrigation I applied a piece of rubber tubing round the neck of the patient to act as a tourniquet. This was sufficiently tight just to make the animal resent it and was kept up for five or ten minutes at a time, thereby also determining a much desired hyperæmia.

On the 7th day, dated from the first injection, the eye certainly presented a more healthy appearance. The ulcer was, if anything, slightly smaller, the corneal vessels not so prominent, and the discharge somewhat less. A further injection of 500,000,000 staphylococci was now given.

On the 16th day there was a considerable improvement. The ulcer had shrunk considerably, there was only a slight discharge each morning to remove, and the cornea was clearing.

On the 26th day marked improvement was recorded. The ulcer had diminished to a mere speck not much larger than a pin-head and

the cornea was clearing rapidly. A further injection of 750,000,000 staphylococci was given.

On the 34th day the patient was discharged, the only remaining condition being a small radiating cicatrix at the seat of the ulcer. This, of course, in time will disappear—as, in fact, at the time of writing it has.

Number of cases treated by autogenous vaccine, 2 ; recoveries, 2.

Causative bacteria : Staphylococci, 1 case ; streptococci with staphylococci, 1 case.

My experience of vaccine therapy in ophthalmic cases is limited to two, but I believe this branch of therapeutics offers great scope in those conditions of the eye having a bacterial origin. The structures of the eye and its appendages liable to bacterial attacks are very delicate. For the destruction of bacteria we are compelled to use antiseptics, but we must ever be on our guard to use them in such stages of dilution that there is no danger of injuring the delicate eye structures. If they are too strong a double drawback occurs—first, injury from without to the parts which we ought to endeavour to preserve, and, second, we diminish the transfusion of immune bodies from within which we ought to encourage. Where the latter is lacking vaccine therapy supplies the stimulus. To sum up : antiseptics in bacterial invasions of the eye are useless. They may be dangerous and we must therefore fall back upon such means as we possess to destroy the bacteria by facilitating the free access of immune bodies to the bacterial foci.

TRYPANOSOME DISEASES OF DOMESTIC ANIMALS IN NYASALAND.*

I.—*Trypanosoma simia*, sp. nov. Part III.

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INTRODUCTION.

In previous papers† the morphology of *Trypanosoma simia* and its action on animals have been described. In this it is intended to give an account of its development in *Glossina morsitans*.

* Reprinted by permission from the *Proceedings of the Royal Society*, 1913, B, vol. lxxxvii.

† *Proc. Roy. Soc.*, 1912, B, vol. lxxxv, and 1913, B, vol. lxxxvi.

Before entering, however, into the details of this particular development, it may be of interest to take a general survey of the various modes of development which take place in the different groups of trypanosomes. It may then be laid down that there is a well-marked separate and characteristic mode of development in each of the three main groups of trypanosomes :—

In the first group—the *T. brucei* group—which includes *T. brucei*, *T. gambiense*, *T. evansi* (?), and *T. equiperdum* (?), the parasites develop—at least in the two first named species—at first through the whole length of the intestinal tract, excluding the proboscis, and eventually reach the salivary glands, where forms resembling those found in the blood of animals are developed, and these alone constitute the infective stage.

In the second group—the *T. pecorum* group—which includes *T. pecorum* and *T. simia*, the development takes place in the intestinal tract, including the labial cavity of the proboscis, and afterwards the trypanosomes reach the hypopharynx, or termination of the salivary duct in the proboscis. Here they revert to the original blood form and become infective. In this group trypanosomes are never found in the salivary glands, and no blood forms, or infective forms, are developed until the hypopharynx is reached.

In the third group—the *T. vivax* group—which includes *T. vivax*, *T. uniforme* and *T. capræ*, the initial stages of the development take place in the labial cavity of the proboscis alone; later the hypopharynx is invaded, where again blood forms are developed, which again constitute the only infective forms. Here also there is no invasion of the salivary glands, and, in addition, no development takes place in the intestinal canal.

In all three groups the common factor which leads to the formation or development of the final or infective forms is the invasion of the salivary tract, and this is accompanied by a reversion to the original blood forms.

DEFINITIONS.

In this paper the word “proboscis” will mean the piercing apparatus of the “fly,” made up of the labrum, labium, labellum and hypopharynx. There are two tubes in the proboscis: one for the passage inwards of blood, made up by the coalition of the labrum and labium, the other for the passage outwards of the salivary secretion—the terminal salivary duct or hypopharynx. The

term "labial cavity" in this paper will mean the former, or tube for conveyance of blood, the word "hypopharynx" the latter, or duct for conveyance of saliva. In the past the use of the word "proboscis," including both tubes, has given rise to a good deal of ambiguity.

The definition of the words "infected" and "infective" were given in a previous paper.*

The term "blood form" means a stage in the development of the trypanosomes in the "fly," when there is a reversion to the original form found in the blood of animals, and from which the cycle of development originated.

THE DEVELOPMENT OF *T. SIMIÆ* IN *G. MORSITANS*.

Eight experiments were carried out with laboratory-bred flies. Two were positive and six were negative. The following table shows these eight experiments, the number of flies used, the number of infected flies found on dissection and the number of days which elapsed before the flies became infective :—

TABLE I.

Date	Experiment	Number of flies used	Experiment positive or negative	Number of infected flies found	Number of days before flies became infective
1912					
May 1 ...	502	20	—	...	...
June 27 ...	754	31	+	2	50
Oct. 9 ...	1477	17	—	1	...
Nov. 11 ...	1582	8	—	...	...
„ 15 ...	1602	20	—	...	...
„ 21 ...	1622	16	—	...	...
1913					
Feb. 5 ...	1847	45	+	7	20 ?
„ 10 ...	1856	16	—	...	...

It will be noted that there is a great difference between the two positive experiments as regards the time required for the flies to become infective. In the first fifty days elapsed, in the second only twenty. This is due to different temperatures under which the experiments were carried out. The first positive experiment was done during the coldest time of the year on Kasu Hill, when the mean temperature was 62° F. (16·6° C.), which is much lower than on the plains, the natural habitat of *G. morsitans*. The flies in the

* *Proc. Roy. Soc., B*, vol. lxxxvi ("Infectivity of *Glossina morsitans* in Nyasaland").

other experiment were kept in an incubator at a temperature of 83° F. (28·3° C.), and they became infective much sooner.

Details of the Two Positive Experiments.

The following table gives the principal details of the first positive experiment :—

Experiment 754.

TABLE II.

Day of experiment	Procedure	Remarks
1—3	Flies fed on <i>T. simiae</i> -infected monkey.	Trypanosomes first appeared on the fifty-seventh day.
4	Starved.	
5—60	Fed on clean monkey.	

It is seen that it was not until the flies had been fed on the clean monkey for fifty-seven days that the animal showed trypanosomes in its blood. If we allow seven days for the average incubation period of the parasite in the mammalian host, then the monkey contracted the disease about the fiftieth day after the infecting fly had fed on trypanosome-infected blood.

The following table gives the principal details of the second positive experiment :—

Experiment 1847.

TABLE III.

Day of experiment	Procedure	Remarks
1—10	Flies fed on <i>T. simiae</i> -infected monkey.	Flies became infective on the twenty-sixth day after first infected feed ; sixteen days after the last.
11	Starved.	
12—27	Fed on clean monkey.	

Since the flies of this experiment were fed on infected blood for a period of ten days, the time required for the trypanosomes taken up by the "fly" to multiply and regain their virulence cannot be accurately estimated. Allowing seven days for the incubation period it cannot be more than twenty days.

When the healthy monkey became infected, in order to separate the infective flies, those remaining alive were divided into three batches. Each batch was put into a cage and fed separately on a healthy monkey. The following table gives the details and results of feeding the three batches of flies :—

TABLE IV.

Experiment	Batch	Number of flies	Number of days fed	Result	Number of infected flies found
1847	1	12	7	—	0
1847	2	10	7	+	3
1847	3	13	7	+	3

The monkeys on which Batches 2 and 3 were fed showed trypanosomes in their blood on the sixth day after the first application of the flies. It is therefore highly probable that the flies infected the monkeys on the first day of feeding.

Details of the Six Negative Experiments.

The following table shows the method of procedure in carrying out the six negative experiments :—

TABLE V.

Experiment	Day of experiment	Procedure	Remarks
502	1—2	Fed on infected monkey.	All flies negative on dissection.
	3—4	Starved.	
	5—42	Fed on clean monkey.	
1477	1—3	Fed on infected goat.	One infected fly found on the fortieth day; proboscis and gut infected.
	4—5	Starved.	
	6—45	Fed on clean monkey.	
1582	1st	Fed on infected pig.	All flies negative on dissection.
	2nd	Starved.	
	3—30	Fed on clean monkey.	
1602	1st	Fed on infected pig.	All flies negative on dissection.
	2nd	Starved.	
	3—35	Fed on clean monkey.	
1622	1st	Fed on infected pig.	All flies negative on dissection.
	2nd	Starved.	
	3—29	Fed on clean monkey.	
1856	1—7	Fed on infected monkey.	All flies negative on dissection.
	8—26	Fed on clean monkey.	

In Experiment 1477 a portion of the intestine of the infected fly was inoculated subcutaneously into a pig; the pig did not become infected.

Out of a total of 173 flies used in these experiments, ten flies (5·8 per cent.) became infected with a growth of trypanosomes in the intestines and in the probosces. It will also be seen that only

one fly in thirty-one (2·7 per cent.) became infected when the flies were kept at ordinary room temperature, whereas four became infected in forty-five (9 per cent.) when the flies were kept at a temperature of 28° C.

GENERAL CONSIDERATIONS REGARDING THE DEVELOPMENT OF
T. SIMIÆ IN G. MORSITANS.

All the flies dying during the progress of the experiments were dissected. In the two positive experiments, out of seventy-six flies dissected, nine infected flies were found. The following table gives the results of the dissection of these nine flies:—

TABLE VI.

Experiment	Time, days	PROBOSCIS		Proventriculus	Crop	Fore-gut	Mid-gut	Hind-gut	Proctodæum	Salivary glands
		Labial cavity	Hypopharynx							
754	37	++	...	++	—	++	++	—	—	—
754	50	++	...	++	—	++	++	—	—	—
1847	16-26	—	—	—	—	++	++	—	—	—
1847	30-40	+	+	—	—	++	++	—	—	—
1847	31-41	++	+	++	—	++	++	++	—	—
1847	31-41	++	—	+	—	++	++	++	—	—
1847	31-41	++	+	+	...	++	++	...	...	...
1847	32-42	++	+	+	—	++	++	++	—	—
1847	32-42	—	—	+	—	++	++	—	—	—

From this table it will be seen that in seven out of nine flies dissected the labial cavity is found to contain trypanosomes. This is very different from what is seen in the similar table relating to *T. gambiense*. There not a single case of infection of the proboscis is recorded.*

At what stage in the development of the trypanosome the proboscis takes a part is not known. It is probable that the infection commences in the intestinal tract and moves forward into the proboscis, but owing to the difficulty of obtaining sufficient laboratory-bred *G. morsitans* the Commission have not, up to the present, enough evidence to establish this detail

In the two infected flies found in the cage of flies, Experiment 754, it is to be regretted that the contents of the hypopharynx were not noted, but in all the infected flies found in Experiment 1847 this was done, with the result that the hypo-

* *Proc. Roy. Soc.*, 1911, B, vol. lxxxiii, p. 516.

pharynx was found invaded by trypanosomes in four out of the seven.

Plate VI represents, at a magnification of 500 diameters, the labial cavity and hypopharynx of an infected fly. While the labial cavity contains clusters of large ribbon-like trypanosomes, the hypopharynx is swarming with small active forms resembling the original blood forms, from which the developmental cycle arose. When the plate is examined, the facility with which a tsetse-fly can infect an animal will no longer be a matter of wonder.

Finally, from the table it will be seen that in no case were the salivary glands invaded.

THE METHODS USED IN THE EXAMINATION OF THE FLIES.

The flies were dissected as described in a previous paper.* An additional method of examining the contents of the hypopharynx was to isolate infective flies by putting each fly into a separate tube, numbering it, and feeding the fly on a susceptible animal with a corresponding number on its cage. The numbers on the cages of animals which became infected indicated the tubes containing infective flies. These, when thus identified, were starved for twenty-four hours, in order to make them hungry. A tube containing one of the infective flies was then taken, and its mouth being covered with mosquito netting was applied to a large cover-glass placed on a man's finger. The hungry fly at once attempted to feed through the glass, and in poking about with its proboscis smeared the surface of the cover-glass with saliva. This was immediately fixed, stained with Giemsa, and examined.

THE TRYPANOSOMES FOUND IN THE PROBOSCIS.

Reference to the table above will show that in Experiment 754 two infected flies were found, one on the thirty-seventh day after feeding on an infected monkey, and one on the fiftieth day, and that the labial cavities of both flies were infected.

The fly that died on the fiftieth day was the one which no doubt actually infected the healthy monkey, since the animal showed trypanosomes seven days after the death of this fly, and no other infected fly was found. As these two flies died before they were isolated, the method of inducing them to salivate on a cover-glass was not used. When, however, the two probosces were examined

* *Proc. Roy. Soc.*, 1911, B, vol. lxxiii, p. 513.

in a drop of normal saline solution under a cover-glass, trypanosomes attached to the labrum were seen growing in colonies in the labial cavity. They were moving freely, and some detached individuals were swimming actively up and down the lumen of the tube.

It is to be regretted that the contents of the hypopharynx were not specially noted. These were two of the earliest experiments, and at that time the contents of the labial cavity and the hypopharynx were not differentiated.

In Experiment 1847 seven infected flies were found. It will be observed (Table VI) that the first was dissected on the sixteenth day after the last infected feed, and that the proboscis was not infected. Another fly dissected on the thirty-second day had also no infection of the proboscis. A third fly dissected on the thirty-first day had the labial cavity of the proboscis infected, but not the hypopharynx. The remaining four were found to contain swarms of trypanosomes in both the labial cavity and the hypopharynx. On examination it was observed that there were two distinct varieties. The one found in the hypopharynx closely resembled small blood forms of *T. simia*. They swarmed in the narrow tube, which had the appearance of being blocked up by their enormous numbers. These small blood forms of the parasite were readily distinguishable from those growing in the labial cavity. Those growing in the labial cavity resemble *Leptomonas*, and are peculiar in having their non-flagellated extremity prolonged to a snout-like extension. They are assembled in clusters and attached by their flagella to the inner surface of the labrum, their prolonged free extremity moving vigorously in the lumen of the tube (Plate VI, fig. 1).

The contents of the hypopharynx of a living infective fly isolated from Batch 2 was examined by inducing the fly to salivate on a cover-glass as described above. On examination of the stained preparations typical blood forms of *T. simia* were seen embedded in the saliva which the fly had ejected on the cover-glass in its efforts to reach the skin. Another infective fly was taken alive from its glass tube and its proboscis gently squeezed until a minute drop of fluid was observed at its tip, which was then lightly rubbed over a cover-glass. Here again typical blood forms of *T. simia* were found embedded in the salivary secretion.

In Experiment 1847 it is seen that a positive result is associated with the finding of infected flies in which *T. simia* resembling those found in the blood of infected animals are found in large numbers blocking up the tube of the hypopharynx.



FIG. 1.

PLATE VI.



FIG. 2.

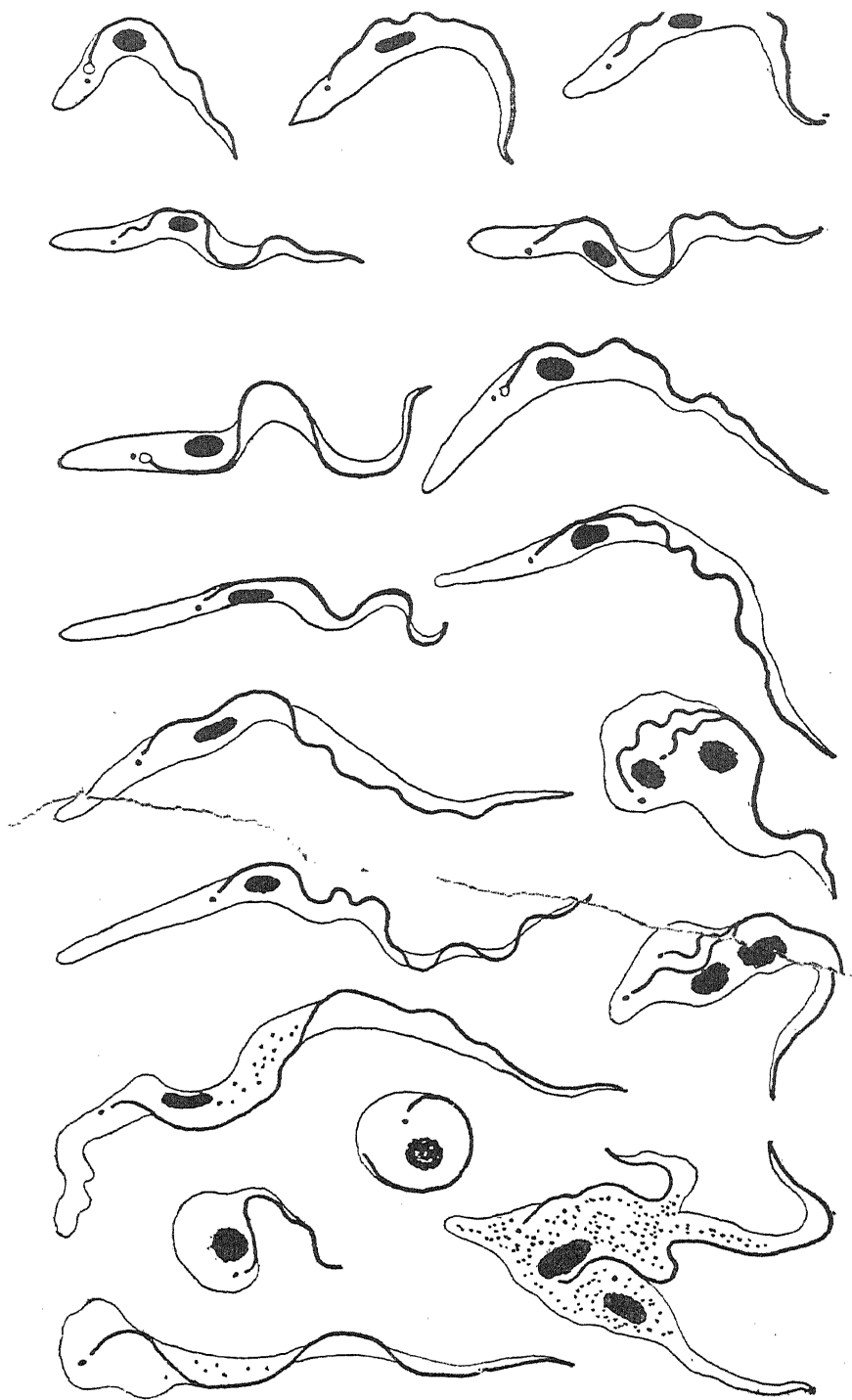


PLATE VII.

The experiment of tempting the infective fly to feed through a cover-glass demonstrates the fact that when the fly salivates, as it undoubtedly does in puncturing the skin, these blood forms of the parasite are washed out of the hypopharynx with the saliva and are injected with it under the skin of the fly's victim.

Further examination of flies, by inducing them to salivate on cover-glasses, revealed the fact that sometimes the long, narrow intestinal forms of trypanosomes are ejected in large numbers on to the cover-glass. There is no doubt, therefore, that an infected fly has the power of regurgitating the contents of its proventriculus and intestines forward into the labial cavity and probably into the blood-stream of the bitten animal. It is conceivable that in this way the proboscis first becomes infected by the intestinal forms of trypanosomes, which attach themselves to the inner surface of the labrum and enter the lumen of the hypopharynx, which they invade, however, only as far as the entrance of the two salivary ducts. Here in the chitinous hypopharynx they establish themselves and, bathed in the salivary secretion, finally complete their development into the infective blood form of the parasite.

It is a curious fact that neither the salivary glands nor even the salivary ducts beyond the hypopharynx have ever been found infected with *T. simiae*.

It was proved by the Commission in Uganda that the blood forms of *T. gambiense* developing in the salivary tract were the virulent forms of the parasite, and it now seems also proved that the developmental forms of *T. simiae* found in the hypopharynx represent the last and infective stage of development of this species of trypanosome in the "fly."

It may be noted here that in the negative Experiment 1477, in which an infected fly was found (Table V), the labial cavity was infected with the long forms of the parasite attached to the labrum, but most careful search failed to reveal infection of the hypopharynx with blood forms. In this fly the parasite had not attained the final and essential stage of its development—the reversion to the blood type—and so the fly was harmless.

THE TRYPANOSOMES FOUND IN THE ALIMENTARY CANAL.

The intestines of infected flies were generally packed full of trypanosomes from the proventriculus to the mid-gut. Sometimes the infection extended to the hind-gut, but never beyond.

Little need be said in regard to the developmental forms found in the intestines. One curious fact, however, emerges, and that is, that it is impossible to differentiate one species of trypanosome from another by the study of these intestinal forms. Whether it is *T. brucei* or *T. gambiense*, *T. pecorum* or *T. simia*, they present the same appearance. Perhaps on further work some differences may become apparent, but at present no difference has been found to exist. The most numerous forms are long, slender, ribbon-like, very active trypanosomes, which in a former paper* were called the normal reproductive type. By comparing Plate VII with the insets of that paper, the resemblance between the intestinal developmental forms of *T. simia* and *T. gambiense* will be apparent.

CONCLUSIONS.

- (1) That *T. simia* can be transmitted from infected to healthy animals by the tsetse-fly *G. morsitans*.
- (2) That *T. simia* multiplies in the intestines and in the labial cavity of the proboscis of the "fly." Here only developmental forms are found, never infective forms.
- (3) That the *T. simia* growing in the intestines of the "fly" has no specific characters by which it can be distinguished from other species of pathogenic trypanosomes found in tsetse-flies.
- (4) That the final stage of the development takes place in the hypopharynx, wherein the infective form of the parasite, similar in shape to the trypanosome found in the blood of infected animals, is produced.
- (5) That the flies do not become infective until about twenty days after their first infected feed.

DESCRIPTION OF PLATES.

PLATE VI.

FIG. 1.—Appearance of the labial cavity of the proboscis of *Glossina morsitans* with *Trypanosoma simia* growing in clusters attached by their flagellar extremities to the inner surface of the labrum. Living and unstained, $\times 750$.

FIG. 2.—Appearance of the hypopharynx in the same fly, showing innumerable small and active *T. simia* almost blocking up the lumen of the duct. Living and unstained, $\times 750$.

PLATE VII.

Intestinal developmental forms of *T. simia*. These do not differ in appearance from the developmental forms of other species of pathogenic trypanosomes found in the intestinal tract of tsetse-flies.

* *Proc. Roy. Soc.*, 1911, B, vol. lxxiii, p. 513.

Clinical Articles.

PARALYSIS OF THE RIGHT VOCAL CORD ONLY, IN A ROARER.

BY FREDERICK HOBDAY, F.R.C.V.S.

Kensington, W.

THE rarity of this condition makes the case worth putting on record, as out of 956 "roarers" in which I have opened the throats and carefully examined the vocal cords this is the only one in which I have ever observed the right cord alone to be paralysed and the left one to move freely. That the left side is paralysed is universally admitted, and occasionally (perhaps in about 2 per cent.), upon opening the throat under chloroform, one finds that neither moves freely, although as the patient regains consciousness the right side will very often commence to move; but for the right one to be paralysed and the left one to move freely must be very rare.

The patient was a bay hunter gelding, 12 years old, with no special details of history other than that it had been purchased by its present owner as a "roarer," with the object of having the ventricle stripping operation performed.

The throat was opened in the usual way and upon inserting the retractor it was observed that the right vocal cord was perfectly still whilst the left one moved quite freely.

The fact was confirmed by several onlookers, one of whom was a veterinary surgeon, and a prolonged observation was made in order that the horse might be well out of the effects of the chloroform. Ineffectual attempts were made to stimulate the right cord to movement and the only thing necessary to complete the case is, when the time comes, if it can be obtained, a *post-mortem* examination of the muscles of the larynx.

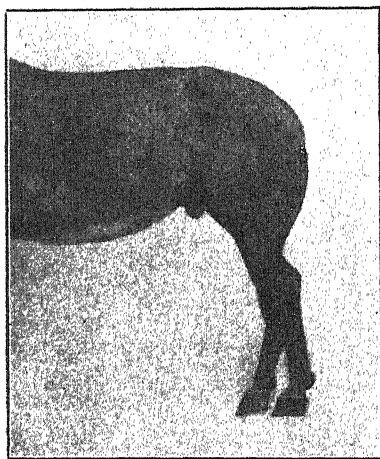
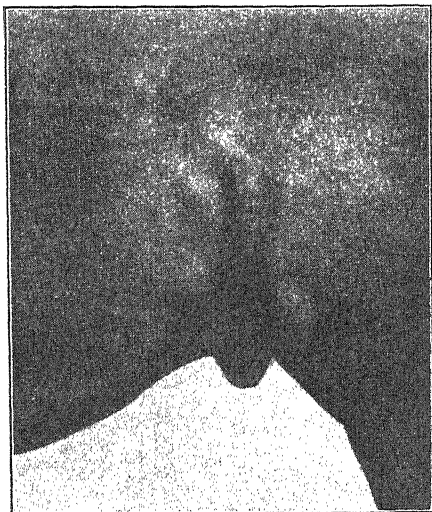
MONORCHID CASTRATION—FLANK METHOD.

BY W. CARGILL PATRICK, F.R.C.V.S.

Mullingar.

HAVING seen my friend Mr. Winter, F.R.C.V.S., Limerick, operating on one of his cases, and liking the method, I decided to put it into practice the first opportunity, which presented itself recently.

The subject was a six-year-old untrained horse; he had been castrated in the usual way on one side as a yearling, I understand, but as the other gland never appeared, he was allowed to remain



untrained, and, as is usual in these cases, his disposition was not of the best; he was sent in for the "rig" operation. On examining *per rectum*, the missing testicle was located about 6 in. in front

of the left inner abdominal ring, and found to be of fair size for a retained gland ; therefore the flank method was adopted, as my experience of removal by the inguinal route has not been wholly satisfactory, descent of bowel having taken place on more than one occasion. The horse was prepared, and a dose of physic administered a few days prior to operation. The site of incision clipped and shaved as shown in accompanying photograph, he was cast with the ordinary hobbles, chloroformed, the usual antiseptic precautions adopted ; then the incision made as suggested by Mr. Winter, blunt dissection being practised on the abdominal muscles. The abdominal tunic was caught up with forceps and a small incision made, same being enlarged by gradually inserting the entire hand, and the gland secured, which in this case was a comparatively simple matter. The cord was abnormally short, still by careful traction it was got just outside the abdominal wound and removed by the H. and D. castrator (which I have found to be a most efficient instrument for the last seven or eight years). Four sutures were inserted in the obliquus externus muscle, and five superficial interrupted ones were put in the skin wound ; there never was the slightest systemic disturbance at any time, and the horse never missed a feed. The accompanying photograph was taken five days after operation, when the swelling was at its maximum : the four buried sutures had been removed, and three of the outer ones.

TUMOUR IN THE ABDOMINAL CAVITY.

By GUY SUTTON, F.R.C.V.S.

Kensington.

THE small extent to which an animal is inconvenienced by the presence of a tumour within the abdominal cavity was lately brought to my notice.

A mare had been regularly employed by a commercial firm for five years as a parcel carter. Early in April it was noticed that she drank a great deal and urinated profusely. She also began to lose flesh, though she was quite good at her work, cheerful, and ate well. There was no rise of temperature or any other symptom to note. At the end of a week she began to "quid" her food, appeared to be hungry and would get food into her mouth, but on attempting to swallow would fail and allow the mash to fall back into the manger.

She has now stopped from work and Mr. Taylor, my colleague, and myself examined her mouth carefully. Nothing was to be noted other than that sharpness of the edges of the molar teeth which was to be expected. This was attended to, and the mare was fed on slops, which she was able to swallow. Wasting now became rapid, and either a tuberculous or cancerous growth was suspected. Rectal exploration yielded no help to the diagnosis, and the mare was tested with tuberculin but failed to act. The temperature never rose beyond 101° F. and the pulse remained good. No medicinal treatment was carried out, and the mare died three weeks after she had been stopped from work, her body being much emaciated, in fact a perfect wreck.

The *post mortem* showed a large tumourous growth, weighing 60 lb., situated between the stomach, liver and spleen.

Mr. Sheather kindly examined a section and reported it to be a "spindle-celled sarcoma."

Was the "quidding" due to nervous irritation from the presence of this growth, making it impossible for the act of swallowing hard food to take place?

FRACTURE OF THE OS PEDIS TREATED ACCORDING TO BIER'S METHOD.

BY LEMIRE AND DUCROTOY.

A FIFTEEN-YEAR-OLD mare showed very severe lameness after an accident at riding exercise. The hoof was very warm and sensitive, rotation movement caused marked pain, and no weight could be put on the leg. An injection of cocaine on both sides of the fetlock joint caused the lameness to disappear. After a few days fracture of the os pedis was diagnosed. Treatment was as follows: warm foot baths and putting on of a Bier's bandage on the middle of the metatarsus for ten hours in the day. After about twenty days a groove was made round the hoof under the coronary swelling and the coronet sharply rubbed with embrocation. Two months after every trace of lameness had disappeared. The mare died later on from meningocephalitis. On section the state of the os pedis was examined, and it was found that there had been a triple fracture which had healed by a relief-like callus thrown out. This shows that in a phalangeal fracture use may be made of nutritive and regenerative venous hyperæmia.—*Revue Vet. Militaire.*

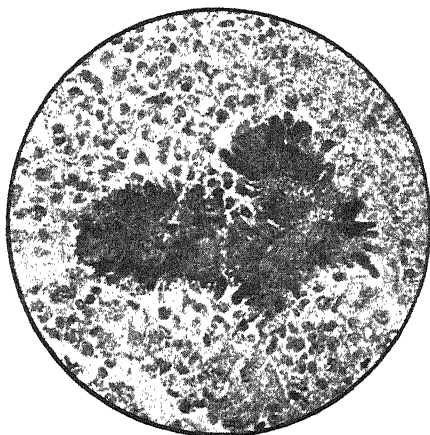
INTERESTING ACTINOMYCOTIC THROAT INFECTION
IN A BULLOCK.

By RICHARD JONES, M.R.C.V.S.

Towyn.

ON May 28 I was asked to see a bullock with some interference with respiration, evidently due to an obstruction at the back of the throat. Upon examination I discovered a pendulous tumour, about the size of a large orange, on the superior surface of the pharynx and extending into the nasal cavity.

I attempted to remove it with the excisor but could not get the chain satisfactorily over it until I had torn away the posterior portion



with my finger. Once the chain was in position it came away without difficulty.

The specimen was sent to Mr. Basil Buxton, M.R.C.V.S., D.V.S.M., at the Research Laboratories of Messrs. Burroughs Wellcome and Co., and upon microscopical examination he readily demonstrated the cause of the infection to be the ray-fungus, the photomicrograph herewith enclosed showing it beyond question to be present.

It is not, I believe, a usual position in which to find an actinomycotic infection and I thought the case of especial interest on that account.

Canine Clinicals.

A CASE OF STREPTOCOCCAL INFECTION IN A DOG SUCCESSFULLY TREATED BY MEANS OF A VACCINE.

By J. B. NIAS, M.D., M.R.C.P.

(From the Inoculation Department of St. Mary's Hospital, London.)

THE patient in the present case was a dachshund, aged 16, which was brought to me in September, 1911, by Professor Hobday for advice about a chronic suppurating swelling which was situated on the outside of the left hock where the dog had been kicked by a man some time previously. The affected area measured about 2 in. each way, and was raised about the level of the surrounding skin. Pus of a thin and watery character oozed from it on pressure through a number of minute orifices which, no doubt, originally had been hair follicles. As the result, no doubt, of applications and the constant licking on the part of the dog, the hair had all disappeared from the affected region, but the surface of the skin was smooth and healthy. The inflammation evidently was confined to the deeper layers of the skin and the subcutaneous tissue, because the dog was not in any degree lame, and flexion of the joint caused no particular pain.

To one familiar with disease as it occurs in the human subject this boggy area of suppuration suggested at once an infection with streptococci of the kind that are plentiful in mud and street dirt, because wounds and abrasions of the scalp which cannot be perfectly cleansed are often followed by cellulitis of a similar character. Contagious impetigo of the scalp and beard also not infrequently present a similar degree of inflammation from the ramification in the connective tissue spaces of chain-forming micro-organisms. The radical treatment of such a condition, in the shape of multiple incisions followed by poulticing or fomentations,* can hardly be carried out in the case of such an animal as a dog, and therefore I was not surprised to see that such local treatment as had been available had proved comparatively ineffective in the hands of Professor Hobday.

There is a substantial difference, from a clinical point of view, between affections due to staphylococci and those due to streptococci,

* These had been most assiduously tried for five months, as had also applications of iodine, formalin, chinosol, creolin, and other antiseptics; several astringent lotions, powders and ointments. All had failed and the condition of the affected area was steadily getting worse.—FREDERICK HOBDAY.

in that the former cause frank boils or abscesses which come to a head and disperse, while the latter form brawny or indurated swellings which, when acute, are classed as erysipelas, and in a more chronic form are generally summed up as cellulitis. The distinction may not be absolute, but it has a good deal of practical value. The positive chemiotaxis or so-called bacteriotropic action of staphylococci is so great that it causes a copious afflux of leucocytes to the part which not only take up the micro-organisms, but also have a solvent or digestive effect on the tissues which causes the formation of an abscess cavity, which speedily makes its way to the surface through the same solvent process and then evacuates itself so that the process comes to an end. But the toxic effect of streptococci on leucocytes is so much greater that the battle waged between them and the micro-organisms is much more evenly contested, resulting in the condition which is defined as erysipelas, or, if more chronic, as cellulitis. If by art we can intervene in this contest by supplying in some way the deficient chemiolactic or bacteriotropic substances, we may terminate the condition speedily and effectually by an imitation of the natural process.

With a view to intervention of this kind, one's first step was to endeavour to isolate the cause of this curious subacute affection, so as to prepare therefrom what is known as a bacterial vaccine, a term which is somewhat of a misnomer for a remedy applied to a lesion already in existence, but which is sanctioned by authority.

Accordingly, on the occasion of the first visit, the skin of the part having been carefully cleansed, some drops of pus were carefully expressed from the orifices already mentioned, and two agar-tubes were inoculated with the pus and smears were in addition made on several slides for microscopic examination. The cultures proved sterile after twenty-four and forty-eight hours' incubation at blood-heat; and the slides also showed, after appropriate staining, practically no micro-organisms, so much so that I queried whether the lesion might not after all be simply secondary to some undiagnosed injury of bone. However, the history disposed of this suggestion. A day or two later a second attempt was made, and on this occasion the slides showed several zooglœal masses of a Gram-staining diplococcus with a tendency to form chains distributed in the pus; other forms of infective agent like actinomyces or trichophyton were simultaneously excluded. Two inoculated agar-tubes this time gave, along with a colony or two of *Staphylococcus albus*, a scanty

growth of discrete round glassy colonies which proved to be a pure culture of a short-chained streptococcus like that seen in the slides.

The characteristics of streptococci are so indecisive, and the means of distinguishing them specifically so troublesome, that the question of the exact specific characters of the organism isolated in this case may be left over for the present. Suffice it to say that as soon as it was isolated it was tested crucially for being the cause of the infection by being employed for its cure in the shape of a vaccine.

The idea which presides over the employment of such vaccines is that a dead culture of the micro-organism causing a bacterial infection, when injected into the connective tissue of the subject of the infection at a distance from the seat of disease in proper doses, has the power, in a way which we do not perfectly understand at present, of calling forth the production of certain active substances of whose intimate nature again we are still very ignorant, which will stimulate a flagging phagocytosis to such a degree as to bring about the termination of the infective process which is going on on natural lines. That this can be effected is now an admitted fact and the system of treatment resulting is known as therapeutic inoculation. For a description of the whole subject the reader is referred to such works as Wright's "Studies in Immunization," Emery's "Immunity and Specific Therapy," and other text-books of the kind.

From the isolated streptococcus above described, a vaccine was prepared *secundum artem*, in a way which need not be described in detail; and a dose of $\frac{1}{2}$ c.c. of the vaccine representing ten millions of dead streptococci was injected into the flank of the dog by Professor Hobday. This would represent a full dose of streptococcus vaccine for the human adult, and I was rather in the dark as to its effects upon a dog of the size of a dachshund, so that the dog's owner was warned that rigors and other symptoms of a constitutional disturbance might supervene. This, as a matter of fact, did occur to a trifling extent; and in the next case of the kind I should probably begin with a dose of five millions only. In the absence of Professor Hobday I saw the dog again a few days afterwards, and thought that I could already see an improvement in a flattening down of the skin over the distal part of the tumefied area. I bottled three more doses of the vaccine into capsules at the rate of two and a half millions per dose for Professor Hobday to administer

at his discretion, and these were followed by three more at the rate of five millions per dose. The result seems, by Professor Hobday's account, to have been entirely satisfactory, and therefore one hopes, on the principle of the cure showing the disease, that as a matter of fact one did succeed in isolating the real cause of the condition. On the veterinary aspect of the case I leave Professor Hobday to speak.*

To veterinary surgeons who have not yet addressed themselves to the study of this method of treatment, I will merely say that, in my opinion, like doctors, they will have to familiarize themselves with it very thoroughly in the near future, under pain of losing their professional credit.

INTUSSUSCEPTION IN A DOG.

By R. V. PILLAI, G.B.V.C.

Curator, Bengal Veterinary College.

"INVAGINATION," or telescoping one portion of the intestines into another, appears to be quite a common occurrence in young dogs. Owing to the absence of any distinctive symptoms it is invariably mistaken for, or at least not easily differentiated from, acute obstruction of the bowels. The condition is the result of violent peristalsis set up by a portion of the intestines due to the presence of irritants, worms, &c., and the subsequent portion not responding to the accelerated movement set on by its component part. A variety of causes are attributed to it and its association with icterus is also seldom disputed.

A terrier pup, a pet of the owner, was brought into our canine clinic to be treated for dysentery. The history of the case was that he had been ailing for two days. The owner reported colicky symptoms had been observed on the previous day and that the appetite had been indifferent for a couple of days. He was otherwise in good health and spirits.

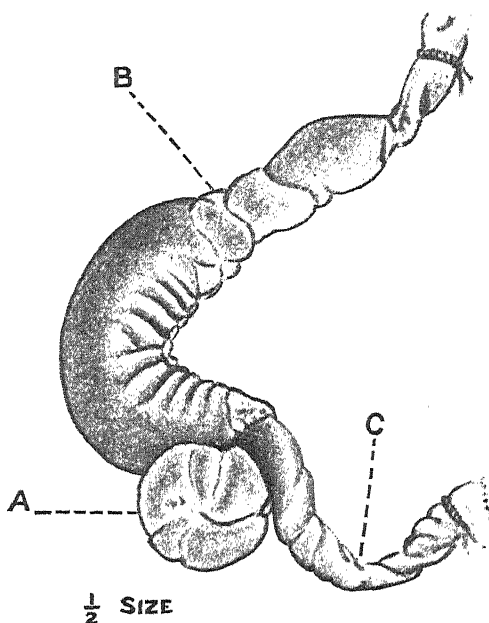
On admission his temperature was 102.2° F., membranes icteric, in fact intensely jaundiced. Manipulation of the abdominal region did not show any abnormality. A microscopical examination of the blood showed negative result. He strained violently to bring out only a few drops of sanguineous mucus and was apparently none the worse for the trouble.

* The case had been, up to the time of the use of the Vaccine, most disheartening. After the third dose there was a distinct and visible improvement and the progress towards a cure was uninterrupted. The dog is still alive (July 1914) and there has been no relapse.—FREDERICK HOBDAY.

A dose of calomel with mag. carb. was prescribed. He did not live long to show more diagnostic symptoms, having succumbed the following day.

Autopsy revealed an old intussusception of the enteric variety; the ileum and the cæcum had invaginated for about 4 in.

To refer to the sketch, the incarcerated ileum extended as far as arrow B, the loop A having been formed at the entrance. The bulging anterior portion was almost treble the normal size and did not yield to pressure, a hard mass of fæcal matter having encircled the portion telescoped, pressing the blood-vessels too tight to admit of any free circulation. The thinner portion C was empty and



Intussusception of the bowel.

shrivelled up and was apparently atrophied, having lost its normal function.

Section of the bulging portion showed also some young spiroptera, not sufficiently numerous to lay hold on, as the initiative cause of the fatal condition.

The case is interesting inasmuch as the condition must have existed for some time without any appreciable constitutional trouble—the invagination must have been at least a month old—also because the end was so abrupt.

TENTH INTERNATIONAL VETERINARY CONGRESS,
AUGUST 3 to 8, 1914.

GENERAL MEETINGS.

- (1) *Official Opening Meeting*, Monday, August 3, at 11 a.m.
- (2) *Foot-and-mouth Disease*, Tuesday, August 4, at 10 a.m.
- (3) *Tuberculosis*, Wednesday, August 5, at 10 a.m.
- (4) *Epizootic Abortion*, Thursday, August 6, at 10 a.m.
- (5) *Public Control of the Production, Distribution and Sale of Milk in the Interests of Public Health*, Friday, August 7, at 9 a.m.
- (6) *Disinfection of Wagons*, Friday, August 7, at 12 noon.
- (7) *Official Closing Meeting*, Saturday, August 8, at 12 noon.

SECTIONAL MEETINGS.

Section I.—Veterinary Science in Relation to Public Health.

- (a) "Meat Poisoning—Its Pathogenesis and the Measures Necessary to Guard Against It," August 4.
- (b) "General Principles to be Observed in the Inspection of Carcases and Organs of Tuberculous Animals with a View to Determine Their Safety as Articles of Human Food," August 5.
- (c) "Construction and Interior of Stables in Relation to the Prophylaxis of Diseases of Animals, especially Tuberculosis, and also to the Hygiene of Milk," August 6.

Section II.—Pathology and Bacteriology.

- (a) "Johne's Disease," August 4.
- (b) "Bovine Piroplasmoses" (European), August 5.
- (c) "Ultra-visible Viruses," August 6.
- (d) "Distemper (Etiology and Vaccination)," August 7.

Section III.—Epizootiology.

- (a) "Anthrax," August 4.
- (b) "Swine Fever," August 5.
- (c) "Glanders," August 6.
- (d) "Sarcoptic Mange of the Horse," August 7.

Section IV.—Veterinary Medicine and Surgery.

- (a) "Anæsthesia," August 4.
- (b) "Laminitis," August 5.
- (c) "Surgical Treatment of Roaring," August 6.
- (d) "The Use of Drugs in the Treatment of Disease caused by Nematode Worms," August 7.

Section V.—Tropical Diseases.

- (a) "Diseases Transmitted by Ticks: Their Classification, Treatment and Prevention," August 4.
- (b) "Diseases Transmitted by Winged Insects: Their Classification, Treatment and Prevention," August 5.

Section VI.—Zootechny.

"What Influence has Heredity on the Early Development of Affections which Impair the Economic Usefulness of Horses? What are the Manifestations of these Influences that should be Avoided in the Selection of Breeding Animals?" August 6.

PROGRAMME OF RECEPTIONS.

Sunday, August 2.

Reception by the Organizing Committee and Members of the Royal College of Veterinary Surgeons, to be held at the Hotel Cecil, Strand, London, W.C., from 8.30 to 10.30 p.m.

Tuesday, August 4.

Conversazione, given by the Organizing Committee, and Members of the Royal College of Veterinary Surgeons, at the Natural History Museum, South Kensington, to Members of the Congress, from 9 to 11.30 p.m.

Wednesday, August 5.

Official Dinner of the Congress, at the Hotel Cecil. Price of tickets: Gentlemen, £1 1s.; Ladies, 16s.; inclusive of wines and cigars. Members intending to be present should notify the Honorary Secretary before Tuesday, July 28, 1914.

Thursday, August 6.

Dinner to Government Delegates, given by His Majesty's Ministers.

Friday, August 7.

Municipal Reception to Members of the Congress.

NOTICE AS TO DRESS.

For morning and afternoon meetings.—Gentlemen: Morning coat or frock coat. Ladies: Morning dress.

For all evening meetings, receptions, dinner, &c.—Gentlemen: Evening dress. Ladies: Evening dress.

It may be necessary to wear *levée* dress or uniform for Government and Municipal receptions. Instructions on this point will be given on the cards of invitation.

In order that there may be no mistake about invitations, members are requested to register their names at an early date as well as those of their ladies. Cards of invitation will be required for certain of the receptions, and members who have not received these are requested to apply for them at the Secretary's Office as soon as possible after their arrival in London.

The Office of the Secretary will be at the place of meeting during the Congress, the Central Hall, Westminster, and will be open all day on Saturday, August 1, and from Monday, August 3, till Saturday, August 8.

EXCURSIONS, &c.

The Zoological Gardens, Regent's Park, London, N.W.—The Zoological Society has very generously presented 1,000 tickets for free admission to the Zoological Gardens, for Foreign Members of the Congress only, and available for Sunday, August 2, or Sunday, August 9.

Arrangements have been made for Members to visit the Metropolitan Market, Deptford Cattle Wharf, and Cold Storage Establishments during the week of the Congress.

Sight-seeing Arrangements for Ladies.—A Ladies' Committee is being formed to make arrangements for drives and excursions for lady members.

Excursion to Windsor.

Excursion to Pirbright, Hampton Court, &c., Monday, August 10. Leave London, about 11 a.m., by motor, viâ Kingston, Church Cobham, Byfleet, to Pirbright, to inspect the Cattle Testing Station of the Board of Agriculture, returning viâ Chobham, Chertsey, Hampton Court, Twickenham, Isleworth and Kew Bridge, &c., to London, arriving back about 7 p.m. Fare 6s., providing: (1) Seat in motor conveyance; (2) gratuities to driver; (3) the services of a competent representative to act as interpreter and generally supervise arrangements.

Applications for this excursion should be made early as the catering will require to be arranged in advance.

Tuesday, August 11.—Visits to Breeding Establishments. Arrangements are being made to visit several important breeding establishments, including that of J. B. Joel, Esq., at St. Albans, where the famous "Pretty Polly" may be seen.

TOURS.

Select Conducted Tour to Shakespeare's Country, Tuesday, August 11.—Motor tour, visiting Warwick Castle, Kenilworth Castle, Shottery, Stratford-on-Avon, &c. Leave Stratford-on-Avon at 5.25 p.m., arriving in London about 7.50 p.m.

Conducted Tour to Scotland and the English Lakes, from Monday, August 10, to Saturday, August 15. Arrangements will be made to visit Clydesdale Studs from Glasgow, and this tour may be slightly modified to meet these requirements for those who wish to take advantage of same. Inclusive fare, £11 11s.

Conducted Tour to Ireland, from Monday, August 10, to Saturday, August 15. Inclusive fare, £11 7s. 6d.

Conducted Tour to the Isle of Wight and the New Forest, from Wednesday, August 12, to Friday, August 14. Inclusive fare, £4 15s.

Correspondence.

LONDON ORPHAN ASYLUM.

To the Editor of THE VETERINARY JOURNAL.

DEAR SIR,—Through your courtesy may I inform the workers on behalf of Hilda Tait that she was duly elected to the London

Orphan Asylum, being fifth on the list of successful candidates, and through you may I take the opportunity of thanking the many helpers in the profession who have secured this girl's election.

The hard work they have put into canvassing for the election could only have secured those results.

Yours faithfully,

June 23, 1914.

WM. SHIPLEY.

NOTICE.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Manuscript—preferably type-written—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the Manager, VETERINARY JOURNAL, 8, Henrietta Street, W.C.

RANGOON MUNICIPALITY.

WANTED AN ASSISTANT VETERINARY OFFICER.

Applications are invited for the post of Assistant Veterinary Officer to be under the Veterinary Officer of the Rangoon Municipality.

Applicants must be duly qualified Veterinary Surgeons and preference will be given to candidates holding a Diploma in Veterinary Public Health and who have had experience in municipal work. Applicants should state their age and the experience they possess, and should forward *copies* of recent testimonials. Before appointment the successful candidate will be required to undergo a special medical examination by a medical officer to be appointed by the Rangoon Municipal Committee. The successful candidate will, in the first instance, be appointed on probation for one year, on a salary of Rs. 500 per mensem and a horse allowance of Rs. 75 per mensem. If at the end of one year he be confirmed in his appointment, he will be required to sign an agreement to serve the Municipal Committee for a term of two years certain from the date of his confirmation. Thereafter the agreement may be extended by mutual consent to a further period of three years. Subject to the above conditions, the successful candidate will receive salary as follows:—

1st year	Rs. 500	per mensem.	4th year	Rs. 560	per mensem.
2nd "	" 520	" "	5th "	" 580	" "
3rd "	" 540	" "	6th "	" 600	" "

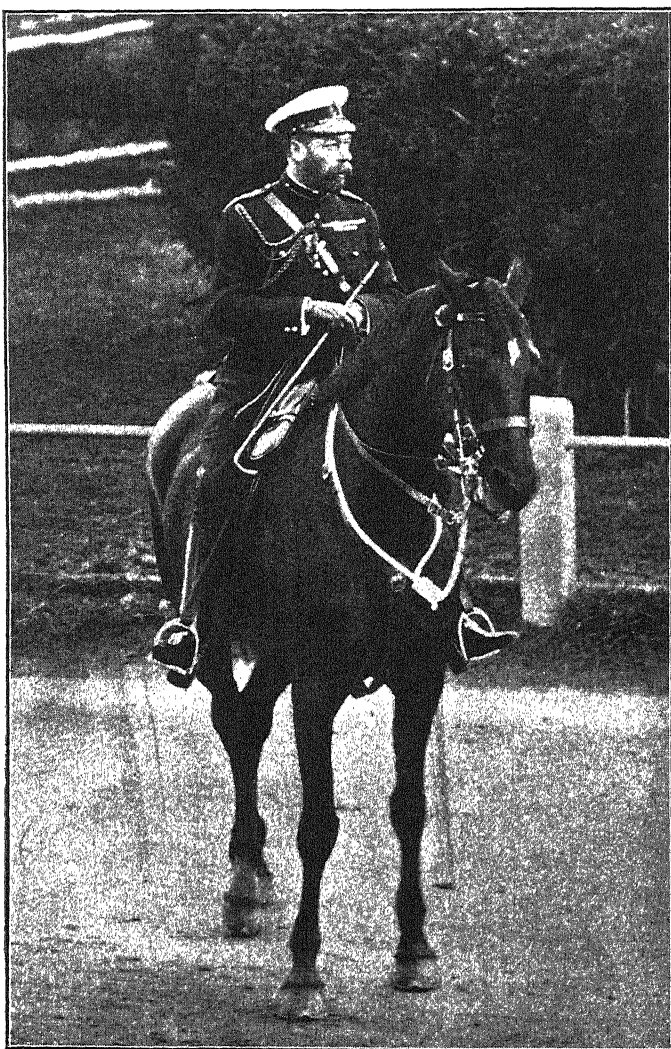
and in addition thereto a horse allowance of Rs. 75 per mensem. From the date of his confirmation in his appointment the successful candidate will be required to subscribe towards the municipal provident fund, according to the bye-laws in force from time to time.

A first class passage to Rangoon will be allowed to the successful candidate, and a similar return passage will be granted on termination of the appointment according to the provisions of the agreement.

Leave and leave allowances will be granted in accordance with the rules in force for the Indian Services of Government. No exchange compensation or other allowances will be granted.

Applications should reach the undersigned not later than Friday, July 31st, 1914.

OGILVY GILLANDERS & Co., Agents for Rangoon Municipality.
67, Cornhill, London, E.C.



HIS MOST GRACIOUS MAJESTY KING GEORGE V.
Patron of the Tenth International Veterinary Congress, London, 1914.

THE VETERINARY JOURNAL

AUGUST, 1914.

Editorial.

THE CONGRESS.

It is in the fitness of things that the VETERINARY JOURNAL, the oldest of our British Veterinary papers, should devote a whole number to the Congress, to whose members, British and Foreign, it extends a hearty welcome.

That the Jubilee Year should be held in England is most appropriate, for it was an English veterinary surgeon, John Gamgee, who originated the idea; and the great success to which it has attained is based upon the initial scheme which he and a few foreign colleagues discussed and started into being.

To the various Permanent and other Committees, composed of eminent men of all nations, must be given the credit of having "kept the ball rolling," and as it is well that the English veterinarian should come into closer contact with his foreign colleagues we are endeavouring by photographs and biographies to aid in attaining that end.

The benefits to be derived by the animal world from the discussion of important questions relating to diseases as they occur in all countries, by men who are past masters in their several spheres, are very great and cannot be over estimated; whilst the up-to-date summaries of the recent work done, show us (and the general public too) what is being achieved to justify our existence and our claim to be placed amongst the useful and learned professions of the world.

The assembling together of so many distinguished men under one roof teaches many lessons, and to the English mind not the least will be a comparison of the differences between the advantages of Government help in the training of our Continental colleagues and the fact of having, as in England, to do what one can by individual help—an impossible task if left to the members of the profession only—for

our benefactors are few and very, very rare. Men who, like Mr. MacCullum in Edinburgh, *can* come forward and give £10,000 to be devoted to the work of the profession are such rarities as to each deserve a pedestal; but if, in addition to being *able* they are also *willing*, their deserts are so great as to be beyond praise.

Would that we had a Rockefeller in England! although we really ought not to have to mention such a thought, for the State should so arrange matters that the idea should never occur. The properly qualified veterinarian is absolutely necessary to the welfare of every country and that his medical and surgical training should depend on private enterprise is an absolute disgrace.

In England, unfortunately, we labour under this disgrace and to some extent the explanation is necessary in order that our foreign colleagues may know and understand that State grants do not come our way as with them.

We welcome our visitors to London—we trust that their stay will be enjoyable—that the interchange of opinions will be of mutual benefit and that they will carry back with them to their respective countries pleasant memories of British hospitality.

THE INTERNATIONAL VETERINARY CONGRESSES.

THE Tenth Meeting of the International Veterinary Congress is appropriately held in London, as England can legitimately claim it was the idea of an Englishman which originated these meetings; and the beneficial effect which they have had on the progress of the profession is more than ordinarily demonstrated by the fact that they have always been successes, in fact each one more so than the one which preceded it.

It is for the veterinary profession and the Government in England to see that we do not suffer our reputation in this respect to be in any way tarnished, and particularly on this occasion, as it was on the idea, and by the energy of, Professor John Gamgee, of the New Veterinary College, Edinburgh, that these Congresses came into being.

In April, 1863, Professor Gamgee wrote a personal letter to a large number of the principal veterinary surgeons in Europe, and as a result the first meeting was held at Hamburg, this lasting from July 14 to 16.

The text of Gamgee's original letter is to be read in the *Archives* of the first Congress, the first President of which was Dr. Edward

Hering, Principal of the Stuttgart Veterinary School. Gamgee was Vice-President, the Secretaries were Dr. Furstenberg—Professor in one of the agricultural schools—and Herr Probstmayer, a military veterinary surgeon of Munich, whilst Herr Schroder, junr., a veterinary surgeon of Hamburg, was elected Treasurer. At the first meeting there were rather more than 100 members, and they included such well-known names as Professor Fuchs of Heidelberg, Gerlach of Hanover, Stockfleth of Denmark, Fuch of Ahrenstock, Pillwax of Austria, Hertwig of Berlin, Falke of Jena, and Hertwig of Stuttgart. They were allowed to meet, by courtesy of the Senate, in the Town Hall of the capital, and Great Britain was represented by Professor Gamgee and Mr. Field, jun., a London practitioner.



THE LATE PROFESSOR JOHN GAMGEE.

The subjects discussed bore chiefly on the questions of Veterinary Sanitary Science and Police, and the prophylactic measures taken in different countries for the prevention and eradication of animal diseases. Especial attention was given to those diseases which are transmissible from animals to man, as well as those which spread from one animal, or group of animals, to another.

Gamgee's idea was that by interchange of opinions between veterinarians of different countries the knowledge of disease might be advanced, and that better and more satisfactory means might be discovered and adopted to keep the contagious ones under control; perhaps even to eradicate them altogether.

By way of illustrating the wide range taken one has only to extract from the list which is given in the report, and which includes rinderpest, pleuro-pneumonia, anthrax, rabies, glanders, foot-and-mouth, influenza, cow-pox, sheep scab, mange, various internal parasitic affections, and much other material of interest—in fact, almost as lengthy and complete a list as is to be read in the *Proceedings* of the Congress of to-day.

The enthusiasm shown and the results obtained insured success from the first, and the progress of the International Veterinary Congress has from that day been assured. The second meeting was held two years later in Vienna, and lasted from August 21 to 26.

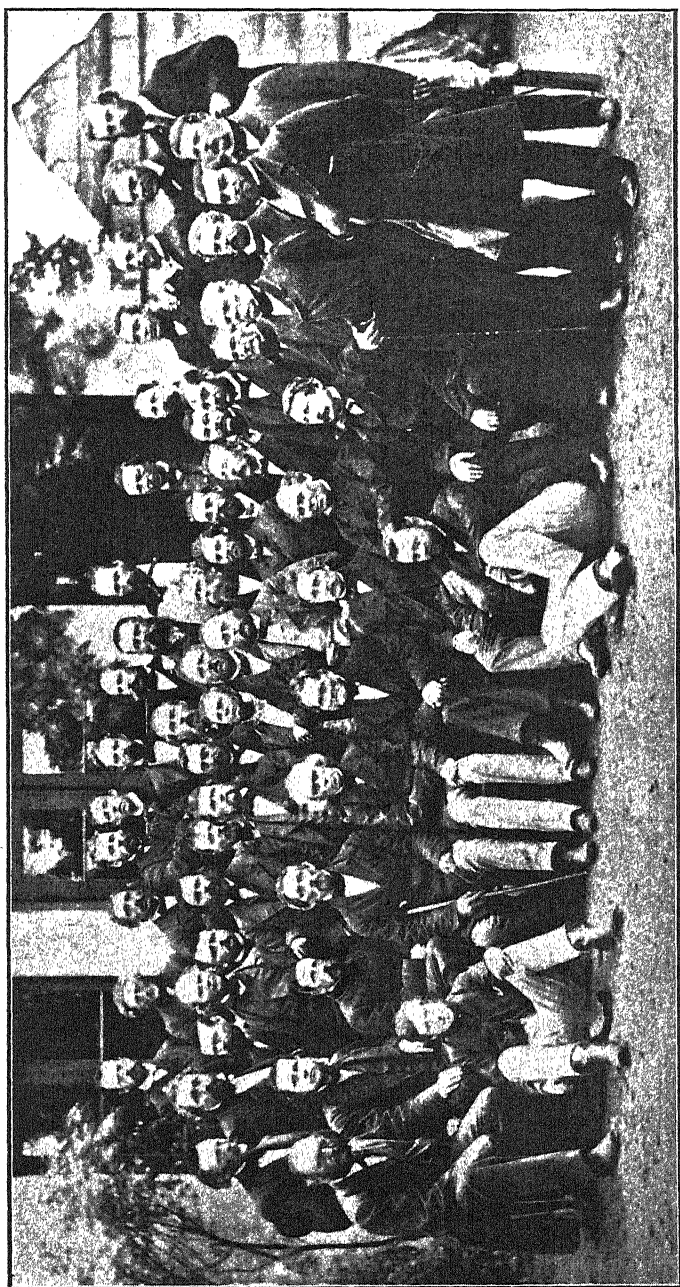
Zurich followed in 1867, and other places visited have included Brussels, Paris, Baden-Baden, Buda Pesth, and the Hague.

Now it is an established institution that a Congress shall be held every four years, and it was only on account of the fact that the International Medical Congress was held in London last year that our Congress was postponed until 1914.

An endeavour is made to visit a different country each time, the selection depending partly upon the decision of the Permanent Committee, and partly upon the willingness of the Government of the particular country selected to receive them. The decision as to the place of meeting in four years' time will be made this month in London. Amongst our guests are to be found the names of some of the most celebrated specialists, on the particular diseases upon which they will discourse, in the world, and to the British practitioner will be given the opportunity of forming acquaintance with his foreign colleagues under most pleasant and instructive circumstances. It remains with us to make their visit of so delightful and pleasant a nature that they will retain a lasting and vivid recollection of British hospitality.

EDITORIAL NOTE.

WE have thought that it will be of marked interest, both to our British and foreign readers, to have on this occasion some photographs of a few of the representative and eminent men, both British and foreign, who are present on this unique occasion. Accompanying these biographical sketches we have pleasure in presenting to our readers a few brief summaries of the organization of members of the veterinary profession in the various States.



A GROUP AT THE FIRST INTERNATIONAL VETERINARY CONGRESS.

THE RT. HON. SIR T. VANSITTART BOWATER,
LORD MAYOR OF LONDON.

Member of the Honorary Committee of the International Veterinary Congress.

THE Tenth International Veterinary Congress is fortunate in its Honorary Officers as in its Organizing Committee, and in no case more so than in that of the membership of its Honorary Committee to which Sir T. Vansittart Bowater, Lord Mayor of London, has lent the dignity of his name and office. To all our foreign delegates and friends the chief magistracy of the ancient City of London is one of particular dignity, not to say magnificence, representative as it is of the greatest commercial and financial centre in the world, and particularly interwoven with the long traditions and glorious history of the metropolis. The office of Lord Mayor has been held by a long succession of distinguished men, and this great and onerous dignity is worthily maintained by the present holder.

Sir T. Vansittart Bowater was born at Manchester on October 20, 1862, whence so many enterprising leaders of commerce and industry have sprung, and is the son of the late William Vansittart Bowater, of Bury Hall, Lower Edmonton, London. The family are related to the celebrated Edward Bowater, Admiral of the White Fleet (1821), who fought in the battle of Trafalgar, and also of General Sir Edward Bowater, who fought and was wounded at Waterloo, and who was Equerry to the Prince Consort.

The present Lord Mayor was educated at Broughton College, Manchester, and at Stourbridge, Worcestershire. He was representative on the Court of Common Council of the City of London 1899, Chairman of the Cattle Markets Committee 1903, Member of the Central Markets Committee 1905, and Sheriff of the City of London 1905. Sir Vansittart Bowater married in 1887, and has four sons and two daughters. Besides the honour of Knighthood conferred on him in 1906, he was made Knight of the First Order of St. Olaf, Norway 1906, Grand Commander of the Royal Order of Redeemer, Greece, and Member of the Palmes of the French Academy.

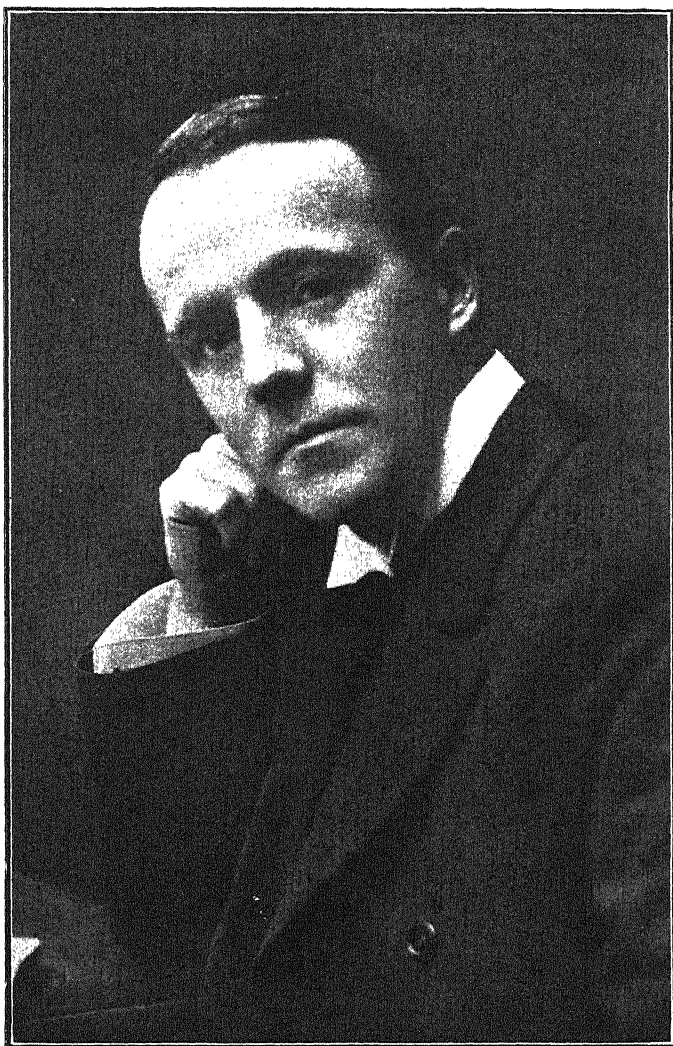
THE RT. HON. WALTER RUNCIMAN, P.C., M.P.

President of the Tenth International Veterinary Congress, London, 1914.

THE RT. HON. WALTER RUNCIMAN, P.C., M.P., President of the Board of Agriculture and Fisheries, who has consented to declare the Tenth International Veterinary Congress open, is an appropriate and distinguished President of the Congress. Previous to his appointment to the Board of Agriculture and Fisheries, Mr. Runciman was President of the Board of Education. He has represented Dewsbury in the Liberal interest since 1902.

Mr. Runciman was born at South Shields in 1870, and is the only son of Sir Walter Runciman, first baronet, the great shipowner and head of the Moor Line of cargo steamers. Mr. Runciman was educated at Trinity College, Cambridge, whence he graduated in 1892, becoming M.A. in 1895. For some time he was Managing Director of the Moor Line and connected with a number of other shipping organizations.

His first parliamentary contest was in 1898, when he stood for Gravesend, but failed in election. The following year, however, he was elected for the first time for Oldham. In 1905 he became Parliamentary Secretary for the Local Government Board, which position he held till 1907, and in which year he became Financial Secretary to the Treasurer. Mr. Runciman's tenure of the Presidency of the Board of Agriculture and Fisheries has been marked by great insight and industry, and the assembled veterinary surgeons of the world are fortunate in his Honorary Presidency.



THE RIGHT HON. WALTER RUNCIMAN, P.C., M.P.

President of the Board of Agriculture and Fisheries.

President of the Tenth International Veterinary Congress, London, 1914.

DR. LYDTIN.

President of the Permanent Committee of the International Veterinary Congresses.

WE believe that our numerous readers will appreciate the unique photograph of our eminent colleague, Dr. Lydtin, which we have the privilege of publishing in this souvenir issue, and which we feel sure will be kept by many in remembrance of an unique occasion ; and with the affection due to an eminent veterinarian, to whom it is our delight and privilege to render the homage of this notice.

Dr. Lydtin was born on July 11, 1834, in Bühl, in the Grand Duchy of Baden. He early devoted himself to pharmacy, besides studying animal medicine and practising for some time in Lorraine. Subsequently to the year 1862 he returned to his native duchy, and in 1865 he was appointed district veterinary surgeon in Baden-Baden. During the Franco-German War he was Veterinarian to the Fourteenth Army Corps. At the close of the war he was appointed technical reporter of the Baden Home Office, and was honoured by the appointment of Veterinary Surgeon to the Court. In 1876 he became one of the principal veterinary surgeons for the Grand Duchy ; in 1881 Reporter for the breeding of animals, and an extraordinary member of the Imperial Board of Health at Berlin. In 1895 Dr. Lydtin retired from the active practice of his profession, while retaining his position as member of the Imperial Board of Health.

Largely to the initiative of our distinguished colleague may be attributed the excellent organization of veterinary affairs in Baden : the cattle breeding, the inspection of meat, and the admirable tables of statistics which have been compiled under his direction. Dr. Lydtin has been a voluminous contributor to professional literature, and has done much to raise the status of the profession in Germany. In cattle-breeding particularly have Dr. Lydtin's tireless energies been of invaluable use, as he has done much to educate the farmers and peasantry in matters affecting the breeding of cattle. The result has been the high reputation of Baden breeds of cattle in the German markets.

Dr. Lydtin has been widely honoured alike by the profession in Germany and abroad, and by foreign Governments, having been the recipient of numerous decorations and medals, including the Order of Leopold of Belgium.

In 1880 the Honorary Membership of the Royal College of Veterinary Surgeons in this country was conferred upon him, and he is also

Corresponding Member of the Academy of Medicine of France and the Academy of Medicine of Belgium. He is an Officer of the French Legion of Honour, and is doctor of medicine of the Friburg, *honoris causa*, and also of the High Veterinary School of Vienna. For the last thirty-five years he has also been Honorary Member of the Russian University at Turgow (Dorpat). As evidence of the confidence and affection with which he is regarded by members of the profession in Germany, it may be mentioned that he is also Honorary Member of the Central Committee of the United German Veterinary Societies, and since 1905 he has acted as President of the Permanent Commission of the International Veterinary Congresses.

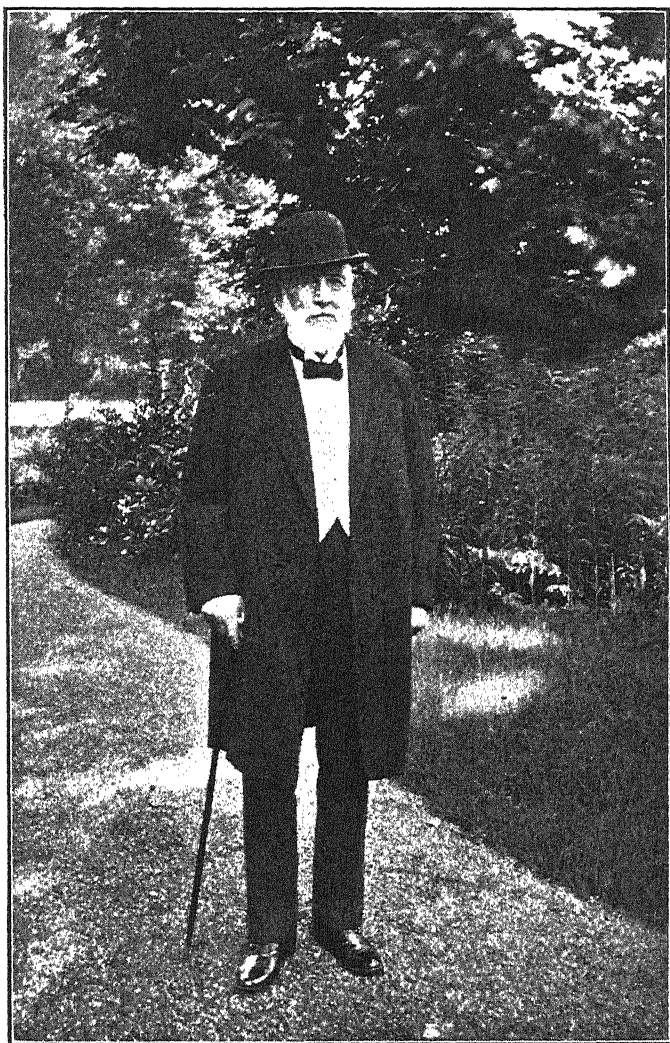
DEVELOPMENT OF THE VETERINARY PROFESSION IN GERMANY.

By A. LYDTIN.

At the beginning of the last century the treatment of animal disease in Germany was mainly, if not entirely, in the hands of medical men, although there had existed Veterinary Colleges in Berlin, Hanover, Dresden, Munich, Stuttgart, Karlsruhe and Marburg, and also a class at the University of Giessen, in Hesse; later on, the colleges at Marburg, Karlsruhe and Stuttgart were closed. Originally, the preliminary education necessary for admission to the colleges, which were all Government Institutions, was very limited. The period for studying at these veterinary colleges range from two to three years, but gradually the Government has demanded a higher level for the preparatory examinations, and since the foundation of the German Empire the standard of education has been steadily raised.

Since 1902 veterinary surgeons in Germany have had to go through an equal preliminary education for university study to that of medical men, and the period of technical study has now been extended to four years. The examination in natural science as well as in the special branch of veterinary science has to be passed, and the former has to be surmounted before the student can enter for the veterinary examination, the veterinary schools having thus attained the organization and extensiveness of universities.

The Dresden Veterinary School was united with the University of Leipzig, and the Munich School with the University of Munich, 1914. These veterinary schools are privileged to bestow the title of



DR. A. LYDTIN.

Geheimer Oberregierungsrat, Baden-Baden.

President of the Permanent Committee of the International Veterinary Congresses.

(A portrait taken in his own garden, on Dr. Lydtin's 80th birthday.)

Dr. Med. Vet. on veterinary graduates, and during the last few years the Imperial Government has gradually, in its admirable administrative organization, separated veterinary from medical control.

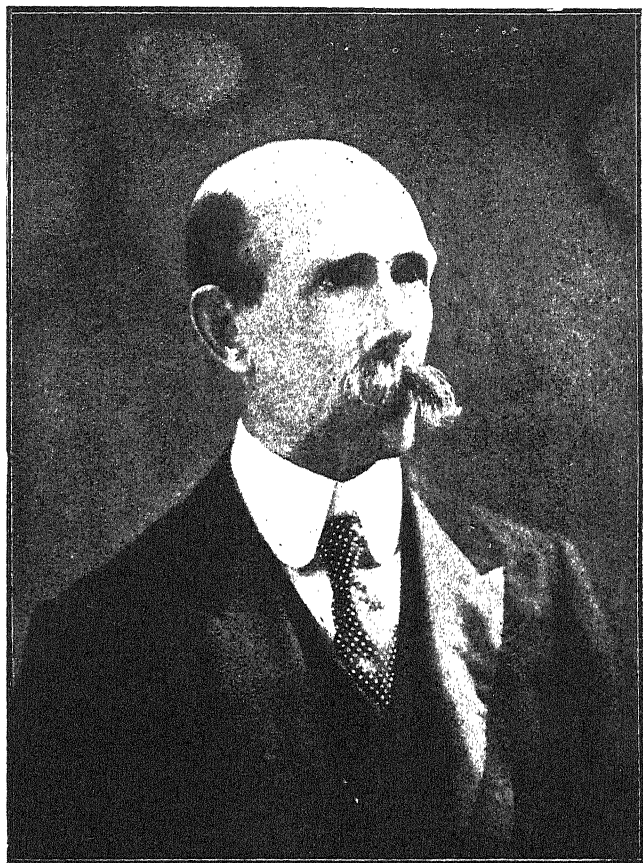
In Prussia the departmental veterinary surgeons have long been employed by the provincial and district councils, and in many other German states official veterinary surgeons have been employed for district and departmental work.

The Grand Duchy of Baden began the reform of its veterinary organization about the years 1863-65. In each district a local veterinary surgeon was appointed to give advice on veterinary matters, and to see that the veterinary regulations were properly executed. Simultaneously, laws were passed which regulated the practice of veterinary medicine, prescribed measures for combating diseases in animals, introduced a more rigorous meat inspection, regulated the slaughter of animals and set up a police for the prevention of cruelty. At the same time vigorous measures were taken for improving the breed of live stock, and in the following years further rules were made for the protection of the national live stock against the importation of diseases from abroad—also with regard to the traffic of cattle at home—on the roads, at the markets, in stables, and during transport by railroad or sea.

Other German states followed Baden's example, particularly Bavaria in 1867. But what was still required in the veterinary profession were more uniform measures throughout the Empire against animal diseases, the regulation of meat and milk inspection, of slaughter houses, &c. After the foundation of the Empire the Imperial Board of Health was set up and henceforth rules for the examination of veterinary surgeons were made common for the whole of Germany. In addition to the veterinary surgeon, laymen who have passed an examination are appointed as meat inspectors and for the inspection of cattle for slaughter. These, of course, must be passed by examination. The demarcation of authority between the non-professional meat inspectors and the veterinary surgeon is sharply drawn. The feature above all others which marks the organization of the profession and national live stock in Germany is the active co-operation and participation of the State. It must be borne in mind that German education in veterinary matters is highly developed, and it is not too much to say that the profession in Germany enjoys a status not inferior to its position in any other country.

SIR JOHN M'FADYEAN, M.B., C.M., B.Sc., M.R.C.V.S.,
LL.D., F.R.S.E.

PROFESSOR M'FADYEAN is well known all over the world as one of the leading scientists of the day, and to the British veterinary profession his work has been of incalculable value. As one of the most eminent principals who has ever presided over the destinies of the London Veterinary College, his influence and example have acted as a stimulus to the career of very many of our present-day students and practitioners, and it is hoped that he may long continue to occupy that position. His energetic work in scientific matters, on Royal Commissions, on the Council of the Royal College of Veterinary Surgeons, and in everything pertaining to the welfare of his profession, together with his willingness to render help to any practitioner or student, are too well known to need comment. His selection as President of the Organizing Committee is a further proof of the confidence with which he is regarded both by his British and foreign colleagues.



SIR JOHN M'FADYEAN, M.B., C.M, M.B.Sc., M.R.C.V.S., LL.D., F.R.S.E.,
Principal of the Royal Veterinary College, London.
President of the Organising Committee, Tenth International Congress, London, 1914.

THE VETERINARY PROFESSION IN HUNGARY.

BY PROFESSOR HUTYRA.

HUNGARY has more than an ordinary veterinary service, due to several reasons; and she has depended for her success in that direction more upon expert knowledge, and not so much upon mere sporadic efforts in the treatment of diseased animals—upon definite and persistent efforts to eradicate the cause of animal disease within Hungarian territory, and to prevent the importation of diseased animals from her neighbours on the east and south side.

Due, therefore, to the geographical situation of the country, it became of first importance to systematically organize the veterinary service throughout Hungarian territory, which was done, and a law dealing with the same was passed in 1888.

That law deals very fully with the whole matter, and insists upon the treatment of all diseased or ailing animals only by fully qualified veterinary surgeons; but that law was supplemented in 1900 by yet again even more stringent regulations based upon the experience and reports from some 640 veterinary surgeons throughout the country. There are seven State sub-inspectors, and one inspector, all under the control and direction of a chief inspector, responsible for the enforcement of the veterinary laws.

With a view to in every way encouraging the study and knowledge of animal medicine, those passing the examinations of the Veterinary High School are entitled to the title of "Dr."

Although much success has been achieved so far in the fight towards the complete extermination of rinderpest, cattle-lung plague, &c., much yet remains to be done.

The Hungarian veterinary profession is well aware of the importance of its mission, and in future will doubtless have still more successes to record.

PROFESSOR DEGIVE.

VINCENT JOSEPH ALPHONSE DEGIVE was born at Rouveroy, near Liège, on January 31, 1844. He was educated at first at the College of St. Quirin. In 1860 he entered the State School of Veterinary Medicine at Cureghem in Bruxelles, and in 1864 obtained his diploma after having passed his examinations with honours. For two years he practised privately in the country, at the end of which period he was included in the professorate at the School of Veterinary Medicine as assistant. In order to enlarge his professional knowledge he undertook a tour during which period he visited the principal veterinary schools on the Continent, including those of Utrecht, Hanover, Dresden, Berlin, Munich, Vienna, Zurich, Berne, Lyon, Toulouse and Paris.

In 1869 he was nominated Professor of Surgical Pathology and of Operative Medicine. Two years later, on the death of M. Defaye, he became head of the clinic. In 1890 he was offered and accepted the position of Principal of the Institution. About this period veterinary education in Belgium underwent some drastic reforms. Before 1890 it was necessary to follow a course of about four years' study and to pass a special examination before admission could be secured to the School of Veterinary Medicine, but in that year a law was passed by the Belgian Parliament which raised the teaching of veterinary medicine to the same status as that of human medicine. Thus the School of Cureghem became second to none among the similar institutions in any part of the world. The law in question lays down that, in order to be admitted to the Veterinary School and subsequently to the examination of veterinary candidate, the student must have received the same education as for the doctorate in the national sciences. It should be noted that this can only be obtained after two years of university study preceded by six years' high school education, and that the duration of the professional veterinary course, not including natural sciences, takes four years.

In 1882 the Belgian State set up a vaccine establishment with the object of procuring at any time in practically unlimited quantities animal vaccines for use in the public administrations and private medical practice. This establishment was placed under the direction of M. Degive by the Government. The subject of this brief sketch has been a member of the Royal Academy of Medicine at Belgium for the last thirty-three years, and in 1894 he occupied the presidential chair.



PROFESSOR A. DEGIVE.

Emeritus Director of the State Veterinary School, Cureghem, Brussels.
Vice-President of the Permanent Committee of the International Veterinary Congresses.

HOFRAT PROFESSOR STEFAN VON RATZ.

STEFAN VON RATZ, who was born in 1860, obtained the degree of Doctor of Medicine at Budapest in 1886, and was appointed assistant to Professor Fodor at the Institute of Hygiene attached to the University. In 1889-89 he studied under Kundral and Virchow, and worked in the Pathological Institute of Gokor and Schutz. On his return he succeeded in obtaining the Veterinary Diploma at the Veterinary School in Budapest, where he was appointed Assistant Professor in 1889, Professor Extraordinary and Director of the Pathological Department in 1890, and full Professor of Pathological Anatomy and General Pathology in 1892, with a lectureship on parasitology. Since then he has taken a large share in the work of the reorganization of veterinary education and all connected with it. Since 1890 he has been General Secretary to the Association of Hungarian Veterinary Surgeons, and has successfully supported all efforts to improve the professional standing and social position of members of the profession. He was editor with Professor Hutyra from 1897 until last year, and since then with Professor Zimmermann, of the Hungarian weekly veterinary journal, *Allatorvosi Lapok*, and is also the editor of a series of veterinary books. At the Seventh International Veterinary Congress at Baden-Baden he was appointed with Hutyra as General Organizer of the Budapest Congress, and as General Secretary was in charge of the transactions and edited the reports. Since then he has been member of, and Second Secretary to, the Permanent Committee of the International Veterinary Congresses. In addition to these appointments he held the Secretaryship of the Budapest Congress

of Hygiene in 1895, Vice-Presidency of the Berlin Congress of Hygiene, of the Budapest Medical Congress and of the Paris Pathological Congress.

His scientific activities include bacteriology, general pathology and pathological anatomy, but before all parasitology. Since 1890 numerous original articles have appeared from his pen in Hungarian, German and French periodicals. In recognition of his scientific work he was elected in 1903 member of the Hungarian Academy of Science, honorary member of the Berlin Veterinary Association, Corresponding Member of the Société Centrale de Médecine Vétérinaire, Société de la Tuberculose, Helminthological Society of Washington, Accademia d'Agricoltura di Torino, &c. For his services to veterinary and scientific education he was made Knight of Franz Josef's Order of the Iron Crown.



HOFRAT PROFESSOR DR. STEFAN VON RATZ.
Veterinary High School, Budapest.
Secretary and Treasurer of the Permanent Committee of the International Veterinary
Congresses.



SIR STEWART STOCKMAN, M.R.C.V.S.

Chief Veterinary Officer to the Board of Agriculture and Fisheries.

Principal Veterinary Officer Board of Agriculture, London; Hon. Secretary of the Organizing Committee of the Tenth International Veterinary Congress.

BORN in 1869, Sir Stewart Stockman is a native of Edinburgh, and graduated with honours from the Royal (Dick) Veterinary College, where he became assistant to Professor (now Sir John) M'Fadyean in the Department of Pathology. In 1892, when this gentleman was appointed Principal of the London College, Mr. Stockman was selected as Professor of Pathology and Bacteriology, a position which he occupied until the Boer War, when he volunteered for South Africa, and was present in several engagements, receiving a medal and four clasps. He then went out to India under the Civil Veterinary Department, remaining, however, only twelve months, before he was offered the position of Veterinary Adviser to the Transvaal Department of Agriculture, from which, two years later, he returned to England as Chief Veterinary Officer to the Board of Agriculture and Fisheries.



SIR ARNOLD THEILER, K.C.M.G.

Honorary Associate of the Royal College of Veterinary Surgeons; Director of
Veterinary Research, Pretoria, South Africa.
Member of the Permanent Committee of the International Veterinary Congresses.

SIR ARNOLD THEILER, K.C.M.G.

No man has done more to elucidate the problem of the animal diseases of South Africa than Sir Arnold Theiler, and nowhere in the world is there to be found a laboratory which is better equipped than the one in which Sir Arnold works at Pretoria.

Born in Switzerland in 1867, Sir Arnold studied veterinary science in Zurich, obtaining from there his licence to practise, and afterwards securing the degree of Doctor in the Veterinary Faculty of the University of Berne.

Travelling to South Africa in 1891, Dr. Theiler practised for a time in Pretoria, and it was then that he saw the great necessity for a scientific study of the animal diseases of the country. In 1893 he was appointed Director of the Johannesburg Vaccine Institute, and subsequently of the Mines Sanitation Department, and the Johannesburg Sanitary Board. In 1896 he became Veterinary Adviser of the late Republican Government, and in 1898 also took over the military duties of Veterinary Officer to the Staats Artillery. In 1900 the New Administration reappointed Dr. Theiler as Veterinary Bacteriologist, and since then until the present time every opportunity for quiet, steady work has been grasped, with results which are known all over the civilized world. His name is known and respected everywhere, and at the International Congresses of Baden-Baden in 1899, and Budapest in 1905, Dr. Theiler was selected personally to represent his Government. The Home Government appreciation of his valuable services was shown by the order of knighthood, which was conferred on him, and the appreciation of his British colleagues is demonstrated in that the Royal College of Veterinary Surgeons have made him an Honorary Associate, and the British Association awarded him the first medal and grant which has ever been made "for the advancement of science in South Africa." It is scarcely necessary to say that the last is a very great honour, and the veterinary profession in England, and in Switzerland, heard with much pride of the tribute conferred upon their learned colleague.

Amongst other scientific qualifications, Sir Arnold Theiler has been Vice-President of the Royal Society of South Africa; he is a "membre correspondant de la Société Centrale de Médecine Vétérinaire," and "membre associé de la Société de Pathologie Exotique."

That he may live long to continue the good and valuable work he has embarked upon is the sincere wish of all his veterinary colleagues.

MR. FRANK GARNETT, J.P., M.R.C.V.S.

President of the Royal College of Veterinary Surgeons.

THE selection by the Council of one of its members to fill the office of President of the Royal College of Veterinary Surgeons for 1914 was one to which it was necessary to give more than ordinary deliberation, the two chief reasons, perhaps, being that the Jubilee Meeting of the International Congress is held in London, and secondly, that the Veterinary Surgeons' Amendment Bill seems likely to be delayed again, the College finances in the meantime rapidly drifting into bankruptcy.

To manage the former in such a way that everyone is pleased, and to manipulate the latter in such a way that the crash will be avoided, would tax the resources even of a Cabinet Minister, but if anyone can do it we have the right man in Mr Garnett. His tact and level-headed common sense are so well known to the profession that they need nothing more than a passing allusion, and his experience on Parliamentary Committees and on the Magisterial Bench will stand him in good stead in his endeavour to steer the ship through one of its most momentous years.

The International Congress Committee, too, have shown their appreciation of his sterling qualities by electing him to the important office of Treasurer; and, what with the responsibilities of this, the duties of the Presidentship, of his magisterial office, and the management of a practice (at Windermere) Mr. Garnett is likely to find the time pass quickly. That it may also pass pleasantly and terminate successfully is the one great wish which we send to our President as being the desire of the whole profession



MR. FRANK GARNETT, J.P., M.R.C.V.S.

President of the Royal College of Veterinary Surgeons, Treasurer of the Tenth
International Veterinary Congress.

DR. DIRK AART DE JONG.

THE subject of this biographical note, after having distinguished himself at the Higher School at Gouda, was entered at the State Veterinary School at Utrecht, and subsequently at the University of the same town. In 1885 he became assistant at the Veterinary School at Utrecht, and afterwards, in 1886, he set up in private practice at Delft, where he remained three years. From 1889 to 1893 he was Professor at the Milk Institution at Oudshoorn, and from 1893 to 1903 Veterinary Inspector of the town of Leyden. In the meantime he had received in 1899 his doctorate of the University of Giessen (Germany), and had been nominated Professor of Comparative Pathology of the University of Leyden in 1908. When he resigned his position as Director of the Abattoir, it was in order to accept the post of Professor of Parasitology and Infectious Diseases at the State Veterinary School of Utrecht, a position which is combined with that of the professorate at Leyden. In addition to these titles he has occupied, since 1906, the Secretaryship of the Permanent Commission of the International Congresses of Veterinary Medicine, and he was the General Secretary of the Ninth International Congress of Veterinary Medicine at The Hague in 1909.

This distinguished savant was nominated Chevalier of the Order of the Lion of the Netherlands in 1910. His contributions to scientific literature are numerous, both in Dutch, German and French, his writings being mainly devoted to pathology, hygiene, and comparative pathology. Dr. de Jong has made a special study of tuberculosis, and has devoted considerable time to research work in his own laboratory at Leyden.

Dr. de Jong is still a comparatively young man, having been born on April 29, 1865, and the position he has already attained in Continental veterinary science gives promise of a still wider reputation, if that be possible, in the years that lie before him.

BRIEF SUMMARY OF THE ORGANIZATION AND PROSPECTS OF THE VETERINARY PROFESSION IN THE NETHERLANDS.

BY DR. W. C. SCHIMMEL.

Professor in the Utrecht Veterinary School.

VETERINARY science and its practice flourish in the Netherlands. On account of the gradual dying out of the empirics, and the general prosperity of agriculture and stock-breeding, veterinary surgeons are highly appreciated. The number of doctors cannot adequately supply the demand; various rural district councils offer considerable subsidies (up to more than £85) to veterinary surgeons in order to induce them to settle in the locality. The provinces, moreover, also contribute towards these grants. Many prefer, with an eye to the future, to become State officials.

The Civil Veterinary Service is presided over by an inspector whose offices are in The Hague. He is in addition inspector of the meat supply. In accordance with the law of July 27, 1870, for regulating the veterinary State supervision and the veterinary police, the country has been placed under the superintendence of certain veterinary surgeons appointed by the State, and called "District Veterinary Surgeons," at present fourteen in number. These officers are responsible to the inspector above mentioned. There are, moreover, a few assistant district veterinary surgeons.

Further, certain "Government Veterinary Surgeons" have been appointed by the Government for the purpose of inspecting and applying the tuberculin test to living cattle exported from some harbours.

Furthermore, the Government has also nominated "State Inspectors" for general and for particular service. Their office consists in the examination of meat destined for export; those "in general service" are not allowed to practise for themselves; their salaries amount to £133 to £200. The "State Inspectors in particular service," however, do carry on a practice of their own. Sometimes the functions of State Inspector and Government Veterinary Surgeon are united in the same person. These positions are a result of the law of May 1, 1909, which requires the inspection of meat intended for exportation. A similar Act, for the general inspection of meat throughout the country, is now in course of preparation, and will shortly be submitted to the consideration of both Houses of Parliament.

Thanks to the excellent maintenance of the ordinances of the



DR. D. A. DE JONG.

Extraordinary Professor at the University of Leyden.
General Secretary of the Permanent Committee of the International Veterinary Congresses.

veterinary police, the Netherlands are now freed from rinderpest, pleuro-pneumonia contagiosa bovum, sheep-pox, foot-and-mouth disease, hydrophobia and glanders, while scabies in horses and sheep and panaritium interdigitalis infectiosa ovis only occur sporadically. The repression of swine plague, hog cholera, and swine erysipelas, of anthrax and tuberculosis, has not yet been successfully accomplished.

With a view to giving the speediest possible effect to the provisions of the law in case of infectious diseases, each district veterinary surgeon has a number of lieutenants to take his place (among the veterinary surgeons in his own district).

Nearly every larger urban district has its own specially appointed veterinary surgeon, who is at the same time charged with the inspection of cattle and meat. The number of abattoirs steadily increases; in the more important districts a number of veterinary doctors are attached to them, in the capacity of director, sub-director, or inspecting surgeon. In a few cases they are also charged with the inspection of milk and dairy products.

Moreover, veterinary doctors are also connected with companies for insuring horses and cattle, either as directors or inspectors.

More than ten years ago the Serum Institute at Rotterdam was opened under the auspices of the State, and under the direction of Professor Dr. Poels. This Institute, intended for the preparation of sera against various diseases, has gradually extended, and is at present in a most flourishing condition. Several veterinary doctors are connected therewith. The sera were at first supplied free of charge, but now is sold at a moderate tariff.

The Royal Veterinary College prospers exceedingly; during the school year 1913-1914, 212 students were entered. Instruction is given by thirteen professors, of whom nine are veterinary surgeons; only certain particular branches are taught by non-veterinary instructors. Moreover, two special professors, two lecturers, two dissectors, four conservators (three of them veterinary doctors) and nine assistants (seven being veterinary doctors) are employed here. The number of new buildings constantly increases; at present funds are being supplied for building new institutes for surgery and for parasitic and infectious diseases.

The Bill to raise the Veterinary College to the status of a university may soon be expected to come before the Second Chamber. The expenses incurred by the Government in respect of the Royal Veterinary College during the year 1913 were as follows:—



Dr. W. C. SCHIMMEL.
Professor in the Utrecht Veterinary School.
President of the Ninth International Veterinary Congress.

DR. W. C. SCHIMMEL.

Director of the Royal Veterinary College, Utrecht.

BORN on February 21, 1846, Dr. Schimmel was nominated on September 1, 1863, as a military scholar at the Royal Veterinary College, with a view to being trained as a veterinarian in the army. After having graduated—*cum laude*—as veterinary surgeon, he was employed in various garrison towns until he was nominated in 1870 to give instruction at the Royal Military Academy in Breda to future officers of the cavalry and artillery in the science of the horse in all its relations. In 1877 he became a professor at the Royal Veterinary College in clinics and surgery, and was made Director of that institution in 1910.

From 1892 to 1909 he was the editor of the *Magazine of Veterinary Science*. Many articles under his name, mostly dealing with surgical questions, appeared in the home and foreign periodicals. While connected with the Royal Military Academy he published, in collaboration with one or two colleagues, a book on "The Science of the Horse," of which a third edition will shortly appear.

In 1909 he was the President of the Ninth International Veterinary Congress, held at The Hague. On December 4, 1913, he received the honorary degree of Doctor of Medicine conferred by the University of Utrecht. In 1908 he was nominated a member of the Permanent Committee of the International Veterinary Congresses.

PROFESSOR CHAUVEAU.

THE veterinary profession is honoured in counting Professor Chauveau among its members. He is universally known and respected. No one, in any age or any country, has done more for veterinary medicine than he. The highest distinctions have been earned by him, not only through his energy and his incomparable work and achievements, but through the worthiness of his life.

In 1848 he gained the diploma of the School of Alfort, and for sixty-four years his untiring ardour has never for an instant relaxed. A volume would be needed for the mere enumeration of his activities.

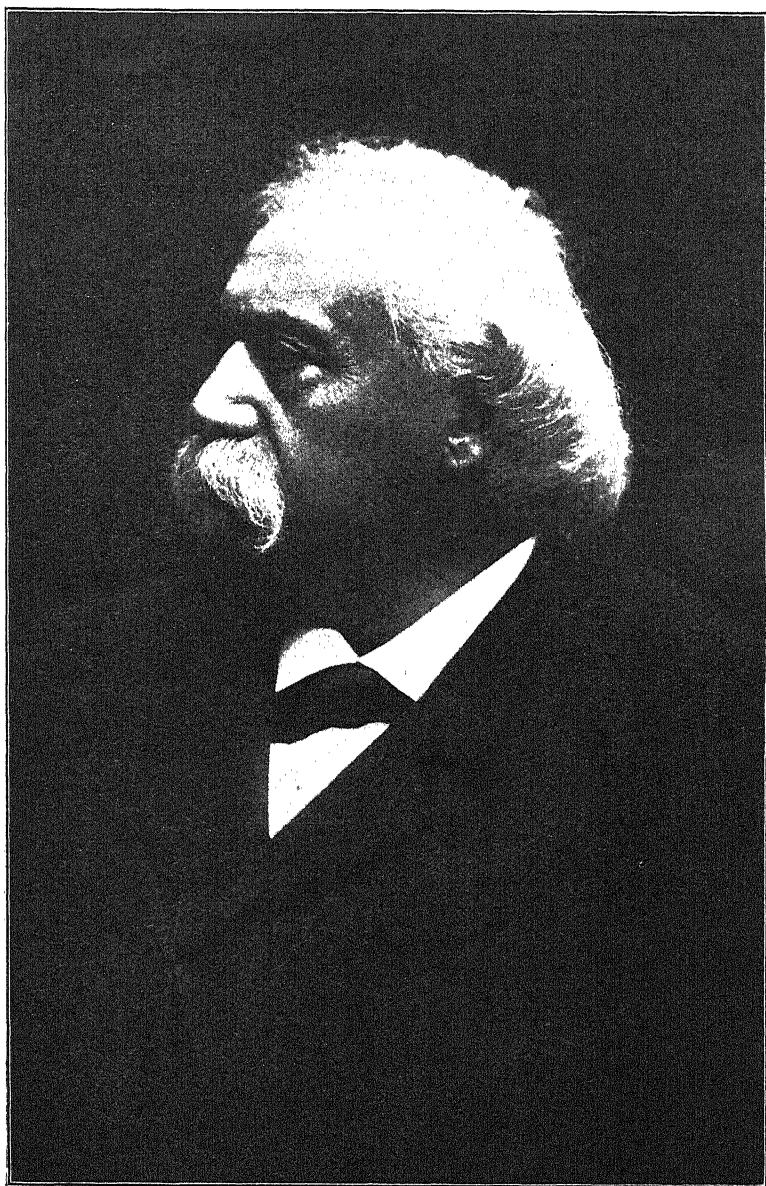
He first began to teach anatomy at the School of Lyons, and while he was there he wrote a "Treatise on the Anatomy of Domestic Animals," which was translated into every important language, and which is still one of the principal guides of veterinarians all over the world.

He became interested in the study of physiology. At the School of Lyons he founded a model laboratory for investigating the manifestations of life, and he was one of the first to make use of recording apparatus, which he continually strove to improve.

He was one of the earliest exponents of the modern science of bacteriology. While this science was yet in its infancy he was aware of the functions of the infinitely small. He was more than a disciple of Pasteur's; he is entitled to share in the glory of the great inoculator.

Professor Chauveau's renown early attracted the attention of the Faculty of Medicine at Lyons, which body was fortunate in securing him as one of their professors—a position which he held for many years, during which time he was also Director of the Veterinary School in the same city.

In 1886 Professor Chauveau became Inspector-General of Veterinary School and also Professor of Comparative Pathology at the Natural History Museum of Paris. His labours were constantly pursued with the utmost vigour, and through his strenuous initiative the Museum laboratory produced some remarkable data, the best known of which are connected with



PROFESSOR CHAUVEAU.

Hon. Inspector-General of Veterinary Schools, France.

Member of the Institute of France, President of the Academy of Medicine, France,
Member of the French Permanent Committee of the Tenth International
Veterinary Congress.

muscular contraction and with the part played by sugar in nourishment.

The most eminent learned bodies are proud to have Professor Chauveau as a member. The Academy of Medicine listens with respect to the pronouncements of our illustrious *confrère*, and the Academy of Science has conferred on him the highly-coveted position of President. The Government of the Republic has honoured him in succession with all the distinctions in its gift and has crowned his career by appointing him Grand Officer of the Legion of Honour.

The life of Professor Chauveau constitutes an example for all. This great worker, who has ever been attracted towards his juniors, was particularly afflicted in recent years by the loss of his two most cherished pupils, Professors Arloing and Lautarie—two experts trained in his teaching.

Without exaggeration, it may truly be said of Chauveau, that surrounded by the respect of those who know him personally, as by those also who are only acquainted with his scientific accomplishments, he is the most distinguished veterinary personality in the world.

THE PRESENT POSITION, ORGANIZATION, AND PROSPECTS OF THE VETERINARY PROFESSION IN SWITZERLAND.

By E. HESS.

THE position of the veterinarians in Switzerland has been greatly improved by higher entrance requirements, that is to say, candidates of veterinary science are now required to matriculate according to the revised regulations of the year 1900. There are two University Veterinary Faculties in Switzerland, one in Zurich, the other in Berne. By thus raising the standard of elementary education the two veterinary colleges of Zurich and Berne were enabled to keep pace in their development with the other natural sciences and with the Faculty of Medicine, their principal object being equal rights and equal obligations for the professional colleges and the same requirements to the scientific education of the veterinary students as for those of other faculties. There is no doubt that in countries where Veterinary Colleges exist, such must, sooner or later, be amalgamated with the Universities, for veterinary science naturally belongs to the class of natural science and medicine, and the comradeship of

veterinary students with those of other faculties is of great importance, especially in after-life. The standard of a veterinary college is enormously increased in a scientific sense by raising the same to the degree of a faculty. The teaching staff is increased and it is possible to train assistant professors.

The fear expressed in former years that the requirements of matriculation and the creation of a medical-veterinary faculty would limit the number of veterinary surgeons has not been realized. On the contrary there are now a much greater number of veterinary students than before, and if the number increases at the same rate as it has done during the last two terms there will also be in this country an over-proportion of veterinarians. Swiss veterinary surgeons require above all very careful and thorough instruction in bovine diseases, the knowledge of which is very important in our country with its eminent cattle breeding and dairy industries. That is why bovine diseases have been made a special study in the ambulatory clinic for many years, for the veterinary surgeon with a country practice could not make his way without a thorough knowledge of this special branch.

PROFESSOR DR. E. HESS.

PROFESSOR DR. E. HESS, Berne, was born March 22, 1860. After having attended the Grammar School at Burgdorf, he matriculated at the Veterinary College of Berne in spring, 1877, and took his degree at the end of the summer term, 1880. On November 20, 1880, he was chosen first clinical assistant; on April 17, 1882, he was promoted as assistant professor, and on April 5, 1884, after having visited other veterinary colleges abroad, he was appointed Professor of Surgery and Director of the Ambulatory Clinic of the Veterinary College of Berne. From 1882-84 he had attended the courses of the Medical Faculty of the University of Berne. In 1900 the Veterinary College was raised to the degree of a Medical Veterinary Faculty, and on this occasion Professor Hess was appointed to the departments of Bovine Diseases, Obstetrics, Veterinary Police and Epizootics, in addition to that of the Ambulatory Clinic. In 1901 he took the degree of Doctor of Veterinary Science. His literary activity comprises chiefly works on bovine diseases. He has been the recipient of many distinctions, among others from the veterinary colleges of Dorpat, Kasan, Charkow, and the Royal College of Veterinary Surgeons, London, and from numerous Veterinary Societies.



PROFESSOR DR. E. HESS.

Professor of the University of Berne.

Member of the Swiss Committee of the International Veterinary Congresses.

THE VETERINARY POSITION IN AUSTRIA.

VETERINARY service and the veterinary profession have developed very satisfactorily in Austria in quite a short time. The first legal regulations of importance were made in 1880, and in 1897 veterinary study was raised to that of a High School plane. Veterinary High Schools were established in Vienna and Lemberg. In 1901 laws were made for the organization of the Government Veterinary Service according to which distinct reporters were assigned to the various fields of political service (district, country, ministry). All veterinary surgeons in the employment of the Government were made equal in rank and standing to other Government officials. Veterinary surgeons of the Government, district veterinary surgeons and meat inspectors all came into being and pursued their callings actively in the various fields.

In 1909 laws were formed dealing on a modern basis with the protection of animals from epidemic diseases and the suppression of these plagues. Compensation in cases of the disease was increased and powers were given to carry out necessary diagnostic and protective inoculations.

The condition of animal epidemics at present is very satisfactory, and Austria has been free from rinderpest since 1881, whilst no case of pleuro-pneumonia has occurred since 1897, and very few cases of glanders are notified. Foot-and-mouth disease is energetically suppressed and other diseases are dealt with quickly and effectively. In swine erysipelas and black quarter curative and protective inoculation is carried out.

There is a Government institute at Modling, near Vienna, where inoculation material is manufactured. They make swine erysipelas inoculations as instructed by Professor Schnürer, tuberculin and mallein according to Professor Reisinger, and Professor Zwick is trying to bring out a special inoculation for black quarter. It is purposed soon to erect an Institution, under the ægis of the Government, for experimental investigation of animal diseases.

G. M.

PROFESSOR A. BINDER, OF VIENNA,

Ministerial Councillor.

BINDER was born in Vienna in 1860. He qualified as a veterinary surgeon in 1882, went into practice in Vienna, and in 1883 he entered the service of the Government. He was a district veterinary surgeon from 1885 to 1893. From 1893 to 1896 he acted in the Veterinary Department of the Ministry; from 1897 to 1899 he acted as veterinary adviser in Vienna to the Government. In 1903 he was appointed veterinary adviser to the Ministry. In 1906, when the Veterinary Department was taken over by the Ministry of Agriculture, he was promoted to the high position of a Government Councillor. Since 1903 he has been on the teaching staff of the Veterinary High School in Vienna. He is a Doctor of the High School, Honorary Member of the Austrian Veterinary Society, a member of the Austrian Government Veterinary Surgeons Association and of the Galician Veterinary Society. He possesses several orders, among which may be mentioned those of Knight of the Austrian Leopold Order, of the Franz Josef Order, and some high foreign orders (Russia, Italy, &c.).



PROFESSOR A. BINDER.

K.K. Ministerialrat und Veterinärreferent, Ministry of Agriculture, Vienna.
Member of the Permanent Committee of the International Veterinary Congresses.

VETERINARY SCIENCE IN ITALY.

IN Italy veterinary science is continually progressing. A comparison with the other civilized countries shows that veterinary schools are proportionally more numerous. There are seven State veterinary schools which are centres of research and also of teaching, the instruction given being of the very best.

During the last twenty years the position of the veterinary profession has been greatly improved, not only in public estimation but in economic conditions.

There are 3,200 veterinarians in the country.

In many Italian communes a veterinary officer is engaged by the public authorities and salaried for the work of prophylaxis among cattle and for meat inspection. In the large towns the veterinary inspectors of meat, milk, and of any other food of animal origin, are drawn from the general body of veterinary surgeons and are fairly well remunerated.

Through their association in professional unions the communal veterinary officers are gradually obtaining their reasonable demands for further economic advantages. Leading zootechnists and hygienists are endeavouring to secure veterinarian management and responsibility in every department of national service where veterinary experience is essential.

The official organization of the veterinary profession was systematized in 1902. All the provinces have a veterinary superintendent for zoopathy and in the most important frontier places and passes veterinary vigilance is exercised through members of the profession. But, whereas at present all sanitary organizations, both veterinary and medical, are under the same general direction with a doctor at the head, he being under the Ministry of the Interior. Veterinarians aspire to separate themselves from the doctors and to acquire autonomy, and there is also an idea of uniting the services of zootherapy with those of zootechnics in the Ministry of Agriculture.

If this ideal should not immediately be realized it is at least expected that public veterinary services should be directed as well as worked by veterinary officers only.

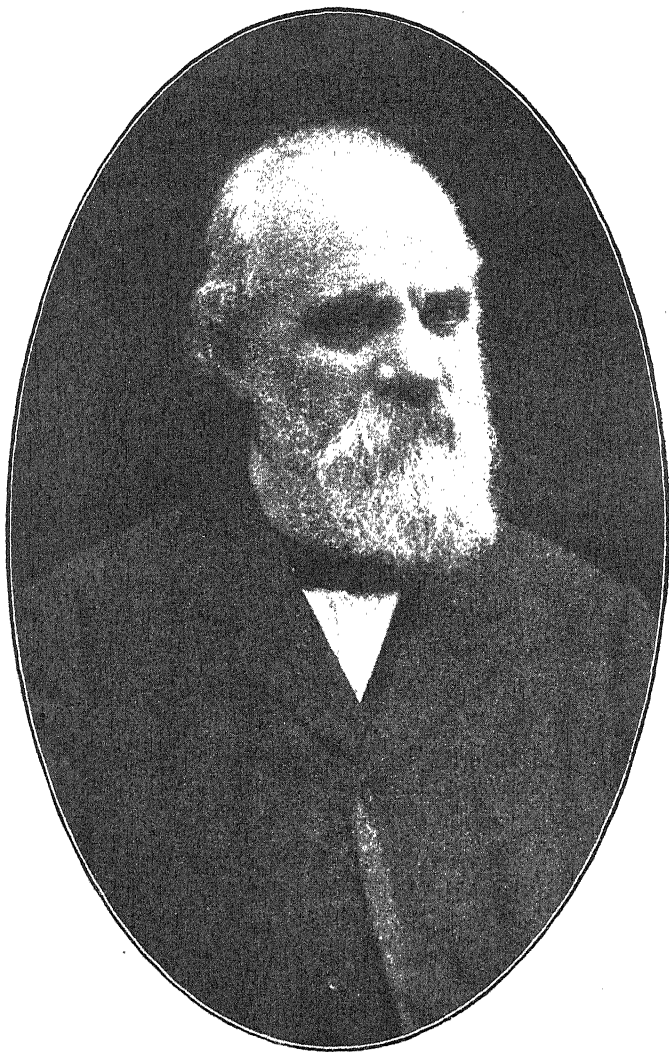
DR. EDUARDO PERRONCITO.

DR. EDUARDO PERRONCITO is a worthy representative of the high place that Italian veterinary science holds in the world, and one of the most popular and best known figures in veterinary circles on the Continent. Born at Viale d'Asti on March 1, 1847, Professor Perroncito was educated partly at Asti and subsequently at the University of Turin, whence he received his Doctorate in July, 1867. The following year, in collaboration with Professor S. Rivolta, he published his first work on "The Structure and Contagion of Animal Tuberculosis," in which he demonstrated the histological identity of bovine and human tuberculosis. Numerous other works followed in 1869, 1873, 1879, and in 1902, all of which were the result of original research work.

In 1878, Professor Perroncito was the first who discovered the microbe of fowl cholera, a discovery which was confirmed shortly afterwards by Pasteur and Toussaint; and his researches into the value of carbon bisulphide for the eradication of bots in horses have been of the greatest value to clinicians and agriculturists.

In 1874 Perroncito was made professor of general pathology of the High School of Veterinary Medicine, and subsequently he became Director of the same institution. He inaugurated a new Chair of Parasitology at the Faculty of Medicine of the University of Turin. In 1879 he was nominated Doctor of the University of Science at Modena, and in addition to these titles he is corresponding member of the Academy of Medicine, and of the Society of Biology, honorary member of the Zoological Society of France, doctor *honoris causa* of the Victoria University, Manchester, and doctor *honoris causa* of the University of Vienna. He is Commander of the Order of the Crown of Italy, and Chevalier of the Legion of Honour. Numerous silver and gold medals have been conferred on him, in addition to the Balbi-Vallier prize of the Royal Institute of Sciences, Letters and Arts of Venice, and the prize of the Academy of Sciences of the Institute of France, of which illustrious College he is Corresponding Member.

Dr. Perroncito has taken considerable part in the local politics of Turin, and has sat on the Municipal Council of that city. He was promoter and founder of the Hospital of Armadeus of Savoy for infectious diseases. He was also one of the founders of the Sero-therapeutic Institute at Milan, and he is associated with a number of other societies and scientific institutions.



DR. E. PERRONCITO.

Professor at the University and at the Veterinary High School, Turin.
Member of the Permanent Committee of the International Veterinary Congresses.



PROFESSOR CADIOT,

Of the Veterinary School of Alfort. Member of the Academy of Medicine of France.
Member of the French Committee of the International Veterinary Congresses.

BORN July 13, 1858, Cadiot entered the Veterinary School at Alfort, 1875, and took his diploma in 1879. After qualifying he was attached as Assistant to the Lectureship of Surgical Pathology, Operative Medicine, Horse-shoeing and Obstetrics at his Alma Mater. Subsequently he was appointed Senior Lecturer, and in 1900 Monsieur Cadiot became Professor of General Pathology and Surgery, a position which he has maintained with dignity, and from which he has greatly assisted in raising the standard of Veterinary Surgery in France.

THE VETERINARY PROFESSION IN NORWAY.

BY DIRECTOR O. MALM, M.D.

THE Norwegian veterinary service is a young administration, considered as an independent one. Before 1890 the Norwegian veterinarians depended on the Medical Director, but since 1890 a separate board for the veterinary service has been established in the department of Agriculture under the lead of a veterinary director. There were in Norway in 1890 only 118 veterinarians, at the present hour there are 255, being placed mostly in public situations as State-veterinarians, county-veterinarians, agricultural consultants, meat inspectors, municipal veterinary leaders and military veterinary surgeons.

By the law of July 14, 1894, the combating of infectious diseases amongst animals was regulated on a modern basis and the municipal meat inspection was ordered by the law of June 27, 1892. In 1895 began the public war against bovine tuberculosis, founded on the principle that the State paid the examination by the veterinary surgeon, provided gratis the tuberculin, and gave half compensation upon slaughtering the tubercular animals. According to this, to Norway, particular system, the fight against tuberculosis has been continued. After this year the compensation will be increased up to three-quarters of the value upon slaughtering a tuberculous animal.

In 1890 a veterinary laboratory was erected for inquiring into the diseases of animals. From this laboratory all the tuberculin has been sent since 1892. Also in the laboratory there are cultivated numerous strains of the tubercle bacilli from man, cattle, pigs, dogs, horses, fowls, and parrots, and the unity of the different strains of the tubercle bacilli is proved by experiments.

This year a new Veterinary Institute will be opened. It is divided in two sections: the one for production of sera, the other for pathological studies. The serum section is led by Mr. Halfdar Hoeth, well known for his works on epizootic abortion and the bacillus Bang, and Halvor Horm, who has published several interesting pathological observations, amongst other things on the lambing sickness and on the septicæmia of rabbits. By the production of the serum against the pig erysipelas and by methodical

examination of stock infected with the epizootic abortion there has now been initiated a systematic war against these two diseases. At the new institute the scope of the serum production will be enlarged.

The Norwegian veterinarians have by their labours as agricultural consultants, as advisers to the studs, and as judges at the Agriculture Shows, exerted a great influence on the development of the races of domestic animals. They have by this work rendered good services, and introduced great economical advances in Norwegian agriculture. By assisting the State in combating infectious diseases veterinarians have contributed in an essential degree to their eradication. Norway is at this time the country which is most free from contagious sicknesses amongst animals. Cattle-plague, pleuropneumonia, foot-and-mouth disease, glanders, rabies, sheep-pox, and sheep-scab have been eradicated from Norway for many years.

It is to be hoped that by a better ordering of the public veterinary positions, *i.e.*, by better salaries, by appointment by the Government instead of the municipalities or counties, and by a fixed regulation of the districts, it will be possible to combat still further the diseases now troublesome to Norwegian agriculture, namely, anthrax, tuberculosis, swine sicknesses, epizootic abortion, and influenza.

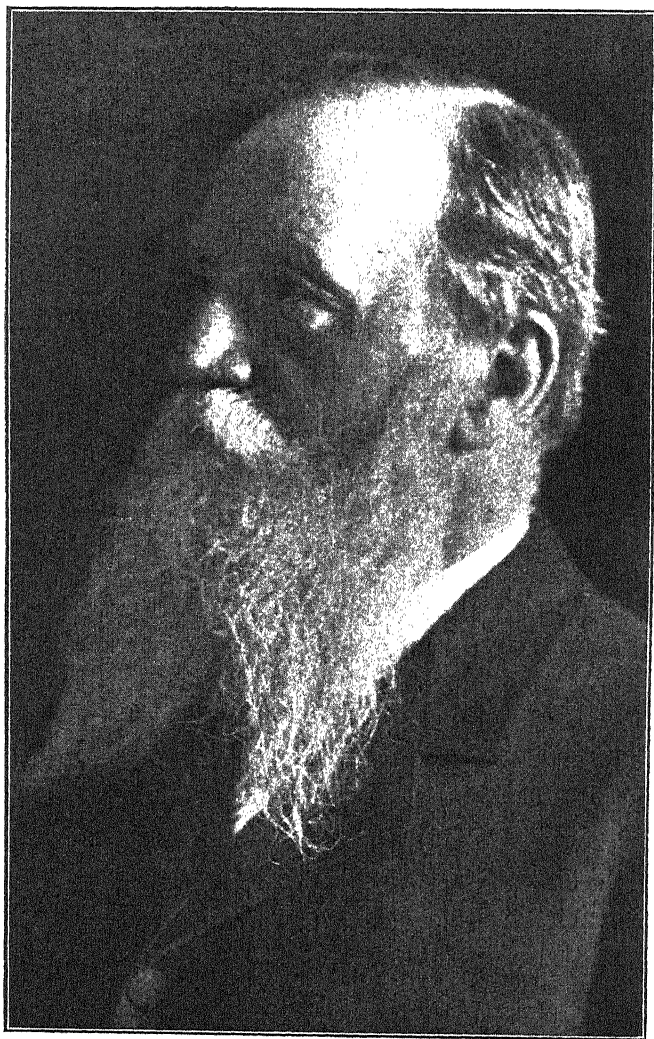
DR. OLE MALM.

DR. OLE MALM, one of the most eminent of our foreign delegates, is Director of the Veterinary Administration in Norway, and possesses surgical as well as veterinary degrees. Dr. Malm is quite a young man, having been born at Stavanger on March 14, 1890. He has been largely responsible for the organization of the Veterinary Administration and the public meat inspection in his country, and initiated the public service for combating bovine tuberculosis. We understand that he was one of the pioneers in the cultivation of the tuberculosis bacilli in Scandinavia. He has published a considerable number of scientific treatises, mainly on tuberculosis, and is a well-known member of a number of scientific societies.



DR. O. MALM.

General Director of the Veterinary Administration, Christiania.
Member of the Permanent Committee of the International Veterinary Congresses.



GEHEIMERRAT PROFESSOR DR. ELLENBERGER.

Rector of the Veterinary High School of Dresden.

Member of the German Committee of the International Veterinary Congresses.

GEHEIMERRAT PROFESSOR DR. ELLENBERGER.

BORN in the year 1848 he began his professional course in Berlin, where he was Tutor and Prosector of Anatomy. In October, 1879, he was appointed Professor of Physiology and Histology at Dresden, and soon after took over the anatomy professorship. Since then his domain of instruction has been : physiology, histology, embryology, and for a few years general therapy. His works are very numerous, dealing chiefly with anatomy, physiology, histology and materia medica (from a physiological point of view). Many of his books have been written in conjunction with Baum. Among the chief are : "Text-book of General Therapy," "Text-book of Histology," "Text-book of Physiology," "Anatomy of the Dog," &c.

Ellenberger became a director of the Dresden High School in 1883 and in that year also he commenced to act on the Commission for Veterinary Affairs, whilst in 1903 he was appointed Rector of the High School, an office which he has maintained with honour and dignity.

VETERINARY AFFAIRS IN THE KINGDOM OF SAXONY.

SKETCH BY PROFESSOR DR. RICHTER.

Dresden.

IN the kingdom of Saxony civil veterinary affairs and veterinary police matters are the concern of the Imperial Minister of the Interior as a superior court. Middle authorities are represented by the district chief superintendents, whilst the subordinate matters of veterinary police are carried out by the official heads of the local police courts—town councillors, burgomasters, parish councils, estate managers.

The second division of the Country Board of Health is that appointed for the scientific office of the country, which gives attention to the interests of the veterinary profession in the government of the State, advises in this matter, gives opinions on the objects of veterinary procedure, and by special committees conducts the State veterinary examinations as well as the examinations for meat inspectors and farriers. To the second division belong, as ordinary members, the veterinary adviser to the Minister of the Interior as president, the zootechnical director of the country (a specially nominated managing associate for this office), a representative of the Veterinary High School, a legal representative of the Ministry, an analytical food chemist, besides three members specially nominated by the Minister of the Interior as extraordinary members; for each of the five chief superintendentships a special veterinary surgeon is chosen. In addition Honorary Associates can be nominated by the Minister of the Interior. At the present time Dr. Ellenberger, Rector of the High School, is a Privy Councillor on the body and also Vice-President of the collective Boards of Health.

The supervision of the veterinary officials rests with the district chief superintendents, who have to come to an understanding with the public veterinary surgeon. The public veterinary surgeon at the present time is Professor Dr. Edelmann, and the position involves being a councillor for veterinary affairs in the Imperial Ministry of the Interior, with the rank of Ministerial Councillor; he must now and again travel round the veterinary districts to examine and supervise the veterinary officials, and, in conjunction with the zootechnical director of the country, arrange meetings between the councillors of land culture and the district agricultural unions.

The District Veterinary Surgeons are classed with the official superintendents as professional gentlemen, and have the immediate

supervision of veterinary and veterinary police affairs; they are chiefly concerned together with the superintendents in the examination of meat and abattoirs, and especially in the combating of contagious and infectious diseases, the furthering of breeding operations, and the care of the public health. There are twenty-nine district veterinary surgeons and one border veterinary surgeon in Saxony, with directors of slaughter-houses at various towns.

Military veterinary matters are in the hands of the Imperial Minister of War. The Veterinary Officers Corps of both Army Corps of the kingdom of Saxony comprises 2 staff veterinary surgeons of the Corps with rank of major, 6 chief veterinary surgeons of the staff designated in rank as majors, 25 staff veterinary surgeons of the rank of captain, 14 head veterinary surgeons of the rank of first lieutenant and 11 veterinary surgeons ranking as lieutenants. Inclusive of the above-mentioned official veterinary surgeons and of the 58 army veterinary surgeons there are 403 ordinary veterinary practitioners.

The Veterinary High Schools are the concern of the Imperial Minister of the Interior; their direction lies in the hands of the Rector and of a man appointed by this three-membered senate.

The College professoriate consists of 10 ordinary professors, an ordinary honorary professor, 5 extraordinary professors, 8 authorized teachers and 9 private teachers, to whom 18 assistants are assigned. The degree of D.V.M. is given by the ordinary professors reinforced by the Medical Faculty of Leipzig University. The Veterinary High School is to be removed to Leipzig in a few years and is to be incorporated with the University. It will then belong to the Philosophic Faculty of the Veterinary Institute of the University of Leipzig.

For the objects of veterinary police supervision the Imperial Veterinary Police Laboratory in Dresden conducts bacteriological and biological examinations for all veterinary surgeons in the country free of charge.

Four veterinary Societies look after the raising and advancement of the profession as well as the fostering of goodwill among their members.

With the exception of the Society of District Veterinary Surgeons the associations are attached to the German Veterinary Council which has for its object the upraising and advancement of the calling in all the federal States.

PROFESSOR LIGNIÈRES.

THIS well-known veterinary surgeon was born on July 26, 1868, at St. Mihiel, in the Department of the Meuse in France, and was educated at the Lycée Charlemagne in Paris. Joining the National Veterinary School of Alfort in 1886, he left in 1890, passing out with honours, and in the same year competed successfully for the appointment of lecturer on contagious maladies, public health, forensic medicine, and jurisprudence.

In 1894 he was appointed Principal Demonstrator in the same Faculty, and later on his chief—Professor Nocard—entrusted him with the direction of the courses in jurisprudence, legal medicine, and bacteriological technology.

In 1897, on the recommendation of Professor Nocard, M. Lignières was sent by the Pasteur Institute of Paris to investigate the infectious diseases of cattle in the Argentine Republic, and in 1897 he founded the Bacteriological Institute of the Ministry of Agriculture in Buenos Ayres, being appointed Director.

Professor Lignières subsequently became Professor of Contagious Diseases and of Bacteriology to the Faculty of Veterinary Science and Agriculture on its establishment in Buenos Ayres. He is also a member of the Société Centrale de Médecine Vétérinaire de Paris, and of the Zoological Society of France, besides being an Academician of the Veterinary Faculty of Buenos Ayres, and one of the South American representatives on the Permanent Committee of the International Veterinary Congress.

His books have brought him much honour and many substantial rewards.

In 1899 he gained the Monbina prize, and in 1901 the Barbier prize of the *Académie de Médecine de Paris*. In 1900 he gained the Monthyon prize of the *Académie de Sciences de Paris*. The National Society of Agriculture of Paris, The "Société Nationale d'Acclimatation," and the Society of French Agriculturists, have all awarded him gold medals. At the International Exhibition of Buenos Ayres, which commemorated the Centenary of the Argentine Republic, he obtained the first prize for his serums and vaccines. He achieved a similar success at the International Exhibition of Agriculture. In addition to all his other distinctions, Professor Lignières is a Chevalier of the Legion of Honour and a Chevalier of the "Order of Merit" in Agriculture.



PROFESSOR LIGNIÈRES.

Director of the National Bacteriological Institute, Buenos Ayres, South America
Member of the Permanent Committee of the Tenth International
Veterinary Congress.

REINHOLD SCHMALTZ, D.V.M.

DR. REINHOLD SCHMALTZ was born on August 26, 1860, in Schönbrunn (Prussia), studied in Hanover and qualified as a veterinary surgeon in 1884. After a short period of practice he was appointed on April 1, 1886, as Prosector at the Anatomical Institute in Berlin, received in 1887 the Ordinariat of Histology, and in 1899 became a Director of the Anatomical Institute. In the years 1907 to 1909 he was invested with the position of Rector of the Veterinary College in Berlin. He is the author of "Topographical Anatomy of the Body Cavities of the Ox," "Exercises in Preparations of the Horse" (3 vols.), "The Structure of the Genital Organs" (part of the "Text-book of Histology," edited by Ellenberger), "The Genital Life of the Domestic Animals" (1 vol. of Harius Text-book of Obstetrics). Three parts of his "Atlas of the Anatomy of the Horse" (in five parts) have appeared. From 1889 to 1910 he edited the *Berliner Tierärztliche Wochenschrift* and brought out the "German Veterinary Calendar."

From 1893 to 1909 he acted as secretary of the German Veterinary Council and of the Central Representation of the Veterinary Union of Prussia. Since then he has been an Honorary Associate of the German Veterinary Council. He is besides an Honorary Associate of the Council of the Veterinary Institute of Dorpat, and since July 3, 1914, he has been an Honorary Associate of the Royal College of Veterinary Surgeons.

G. M.

VETERINARY AFFAIRS IN GERMANY.

By Dr. R. SCHMALTZ, Berlin.

ALL veterinary matters in Germany are centralized throughout the kingdom. The examination regulation for veterinary surgeons of December 24, 1912, decides veterinary development. The teaching is shared by the veterinary medical faculties of the Universities and the individual veterinary high schools existent in Berlin, Dresden, Giessen, Hanover and Munich. The veterinary high schools have the same constitution as the Universities, with a changing rector at the head. The period of study is four years, and entails two examinations; the second examination must be passed in order to give the right to the title of veterinary surgeon and the power to practise. All veterinary schools of instruction have the right to confer the title of Doctor of Veterinary Medicine on the would-be holder of the title submitting himself to a special examination for the degree. All the Federal States insist also on a special examination for those veterinary surgeons who desire to enter the service of the State.

Public veterinary conditions depend chiefly on the German cattle disease laws of 1880, modernized in 1909, and on the Imperial law concerning cattle for slaughter and meat inspection of 1900. Measures against animal diseases are carried out under State control by official veterinary surgeons. The Imperial Health Officer in Berlin possesses a veterinary section with a veterinary director. To the Ministries of individual federal States directing veterinary officials are attached as Ministerial Councillors or Country Veterinary Surgeons (*Landestieraerzte*). In Prussia and Bavaria, which are still divided into administrative districts, each district administration has a directing veterinary surgeon (veterinary councillor of the administration). The smallest jurisdictions, finally, into which all federal States are divided, each have an official State veterinary surgeon with the title of District or Circuit Veterinary Surgeon, or First Official Veterinary Surgeon. The State veterinary surgeons have to carry out and supervise the regulations for the suppression of



GEHEIMER REGIERUNGSTRAT PROFESSOR DR. SCHMALTZ.
Member of the German Committee of the International Veterinary Congresses.

animal diseases. They also have the control of the slaughter-houses and of meat inspection in so far as State control can be exercised in these matters; they also have the supervision of other hygienic regulations concerning other animal matters.

The maintenance of slaughter-houses and the carrying out of meat inspection is the business of the community. The management of abattoirs and meat inspection there lies in the hands of veterinary surgeons who are communal officials. Besides the abattoirs in small towns and in the country, meat inspection is partly carried out by private veterinary surgeons along with the other duties of their practice, and partly by so-called lay inspectors, *i.e.*, men who possess little veterinary knowledge, but who are instructed in ordinary meat inspection. Meat inspection is carried out on all animals sold for food.

The number of private veterinary surgeons attending to the health of animals is large in most parts of the country. Their incomes are as a rule satisfactory. Apart from meat inspection in which most veterinary surgeons act, the ordinary practitioners are entrusted with the execution of certain duties in connection with the suppression of animal epidemics.

Veterinary surgeons serving in the Army are veterinary officers at whose head is a Veterinary-General. In each portion of a cavalry troop several veterinary officers act. They submit to the same study as other veterinary surgeons, but receive a special training as well.

The total number of veterinary surgeons in Germany amounts to about 6,500. The German veterinary surgeons founded a free representative assembly—the German Veterinary Council—in 1874. This comprises all the veterinary unions existing in various parts of the country.

MAJOR-GENERAL ROBERT PRINGLE, C.B., D.S.O.,
F.R.C.V.S.

THE position of Director-General of the Army Veterinary Corps is the highest reward the Service can confer upon those who select to follow this branch of the profession, and to attain such a position is the ambition of every veterinary officer. The selection of Colonel Pringle and his consequent promotion to the title of Major-General has given universal satisfaction, for if one point has been noticeably stronger than another in the career of the new Director-General it is that of tactful administration and organization.

Born at Stranraer in 1855 and educated in Scotland, he is one of the students to whom the Glasgow College can point with pride. He joined the Army Veterinary Department in 1878, just in time to see active service in the Afghan Campaign of 1879-80, for which he holds the war medal. He was in the Waziri Campaign of 1881, where he was mentioned in despatches, and the Zhob Valley Expedition of 1884.

Later, for services rendered during the South African War, he received the D.S.O. decoration, and was again mentioned in despatches, being promoted to Lieutenant-Colonel. At a more recent date still he was made a Commander of the Bath. Nearer home his responsible positions have included those of Principal Veterinary Officer for Ireland, and the same position in the Aldershot Command; whilst in India, on the retirement of the late Colonel Nunn, he was appointed Principal Veterinary Officer.

In the world of sport he is well known as a good rider to hounds, a good polo player, fond of racquets and other outdoor active pursuits. The selection of Major-General Pringle by the authorities at the War Office has been fully justified by the high standard of efficiency and popularity which the Army Veterinary Department has maintained during the term of office in which it has been under his control.



MAJOR-GENERAL ROBERT PRINGLE, C.B., D.S.O., F.R.C.V.S.
Director-General of the British Army Veterinary Service.



PROFESSOR G. MARCONE.

PROFESSOR DR. GIUSEPPE MARCONE is Laureate in Human and Veterinary Medicine, and Director of the Veterinary School of the Royal University of Pisa. He is corresponding associate of the Royal Institute of Naples, and foreign member of the Society of Veterinary Science at Lyons, and member of the Society of Comparative Pathology of Paris. He is at present in his 50th year. He was created Laureate of the University of Naples in 1885, Professor in 1888, and also in the Royal High School of Naples he is Professor of Veterinary Science, Pharmacology and General Therapeutics. He also occupies the Chair of Special Pathology at the Royal University of Pisa.

PROFESSOR LOCUSTEANU.

PROFESSOR LOCUSTEANU, of Bucharest, whose photograph we publish opposite, is one of the most distinguished of our Continental brethren.

Born at Bucharest in 1849, he graduated as Bachelor of Science and Doctor of Veterinary Medicine of the School of Bucharest. He was nominated Professor among many competitors to the Superior School of Veterinary Medicine at Bucharest, and Principal Veterinary Surgeon of the Department in 1873, subsequently being appointed in the Ministry of the Interior, Chief of the Roumanian Veterinary Service of the Home Office. To him fell the greater part of the responsibility of drawing up the law on the organization of sanitary veterinary administration in 1882. On this law was founded the first organization of the Veterinary State Service in Roumania. The law set up the Superior Council on Epizootic Diseases, and conferred on it, among other powers, the preparation of the rules governing veterinary medicine. Professor Locusteanu has been Director of the Scientific School of Veterinary Medicine at Bucharest for more than twenty-five years, and during that period he has succeeded in entirely reorganizing this school. He established in connection therewith the Institute of Zootechnie, and installed the necessary laboratories for that purpose. In 1889 the Minister of Agriculture, Mr. Nicolas Fleva, founded the Zootechnical Service, and appointed Professor Locusteanu to the direction of that service. This work has had an extraordinary development in Roumania, and is at present organized as an independent administration under the Ministry of Agriculture, being conducted at the centre as well as locally by veterinary surgeons, amongst whom are three Zootechnical Inspectors.

Professor Locusteanu also contributed to the foundation of the Society of Veterinary Medicine of Bucharest, of which he is the Honorary President; he assisted in the establishment of the General Association of Veterinary Surgeons of Roumania, which is established for the protection of the veterinary profession in that country, and to co-operate with its members in various directions, acting not only as a friendly society, but notably for the erection of the Superior School of Veterinary Medicine and the Independent Faculty of Veterinary Medicine at the University School, Bucharest. Although the title of Veterinary Surgeon in Roumania is recognized by a special law as equal to that of the grade of doctor, the Society is carrying on a vigorous campaign for the creation of a general administration under the Ministry of Agriculture of the State Veterinary Service and the Zootechnical Department.

There are to-day throughout Roumania upwards of 250 veterinary surgeons; each parish has one, and sometimes two or more. Bucharest employs in its service seventeen veterinary surgeons. The title of Colonel is conferred upon the Chief of the Military Veterinary Service. In addition to this there is a special division under the Ministry of the Interior known as the General Administration of Sanitary Service, and a veterinary commission which is appointed to settle scientific problems, and especially veterinary administration.

The Superior School of veterinary Medicine possesses besides an Institute of Serotherapy, which manufactures and distributes throughout the country vaccines for the prevention of small-pox, as well as different sera for the prevention of diseases of domestic animals, &c.

The Roumanian Veterinary Service has already held three Congresses, viz., in 1883, 1906, and 1913.



PROFESSOR A. J. LOCUSTEANU.

Professor at the Veterinary High School, Bucharest.

Member of the Permanent Committee of the International Veterinary Congresses.



DR. B. BANG.

Professor, Veterinary High School, Copenhagen.
Member of the Permanent Committee of the International Veterinary Congresses.

DR. B. BANG was born in 1848, and studied medicine and surgery at the University of Copenhagen, whence he graduated as Doctor of Medicine. At the conclusion of his university course in human medicine he took up the study of veterinary medicine. He has been physician to the Copenhagen City Hospital and Dean of the same institution during the years 1874-79. In 1880 he was called to the professorial chair of the Copenhagen Veterinary College. Since 1892 he has been Veterinary Adviser to the Danish Government. Next month Dr. Bang retires from the Professoriate at the Veterinary High School, Copenhagen, but he will still retain his position as Chief of the Veterinary Administration of Denmark. He is a Member of the Permanent Committee of the International Veterinary Congress.



PROFESSOR A. LANFRANCHI.

Professor at the Veterinary School of Parma.

Member of the Italian Committee of the International Veterinary Congresses.

PROFESSOR LANFRANCHI.

AN APPRECIATION BY PROFESSOR GUIDO FINZI.

PROFESSOR ALEXANDRE LANFRANCHI was born at Florence in 1876. He obtained his diploma, *cum laude*, in Veterinary Medicine at the University of Bologna. He commenced his distinguished scientific career with a brilliant thesis on "The Intelligence of Animals" (1909), since which period he has produced a very considerable number of works as the result of his studies. At 30 years of age he was nominated Professor of Pathology and Clinical Veterinary Medicine at the Royal University of Modena, and in 1910 he secured, in competition with several other distinguished fellow-countrymen, the position of Professor Extraordinary at the Royal University of Parma. In 1913 he was elected to the Lectureship at Turin, and this year to that of Bologna. Professor Lanfranchi not unnaturally gave his preference to his Alma Mater. Since 1912 this brilliant representative of Italian Veterinary science has held the position of Director of Tropical Pathology and of Veterinary Expert to the Institute at Florence. In the following year he was requested to collaborate in the work which will be published shortly as a homage to Metchnikoff on the occasion of the celebration of the latter's professional Jubilee. As already indicated, Professor Lanfranchi's literary works have been numerous, but we may especially mention his researches in chemistry and in comparative pathology. His experiments in the study of infectious diseases, and more particularly in trypanosomes, has raised him to the position in international veterinary science.

HERR SCHMIDT, OF KOLDING.

BORN near Haderslev on July 15, 1845, Herr Schmidt took his veterinary diploma at Copenhagen in 1872, starting in practice at Smidstruys, and eventually settling down at Kolding. There he soon gained the confidence of the farmers, and by his carefully recorded observations speedily made a name amongst his veterinary colleagues as a skilful and observant practitioner.

As a result of his researches into tuberculosis he published a scheme in 1886 which he had worked for several years with success, and which had acted very satisfactorily in checking this disease in his district. He was the pioneer of the idea that farmers should have their cattle examined at least once a year regularly by a veterinary surgeon, and have the suspected animals isolated and disposed of by fattening or otherwise, so that the loss might be minimized as far as possible.

One of his suggestions, too, was that the milk of suspected cows should not be used for feeding purposes until it had previously been boiled. These ideas were carried out with excellent success as regards the result on the stock in his district, and a few years later were elaborated into the more stringent investigations and application of the tuberculin test by Professor Bang, whose scheme for stamping out tuberculosis in the cattle of Denmark has met with such splendid results. Herr Schmidt's researches into the study of milk fever in cows were first published in 1897, and it needs no words on our part to say how far-reaching and valuable those results have been. In every civilized country of the world Schmidt's treatment is carried out, and the number of lives which have been saved by the treatment alone can be counted in hundreds of thousands. As was stated by Professor Degive at the International Veterinary Congress at Buda Pesth in 1905: "*Par sa méthode thérapeutique notre confrère Schmidt a rendu à l'Agriculture et à la fortune publique des services incalculables. Du même coup il a élevé la valeur et le prestige de la Médecine Vétérinaire.*"

Herr Schmidt has been decorated by the King of Denmark as a Knight of Danebrog, and has been awarded a vote of thanks, together with an annual premium, by the Danish Parliament; also in many countries of the world (including Great Britain) he has been honoured with the degree of Membership of many Veterinary and Agricultural Societies.

He still takes the greatest interest in all matters pertaining to his profession, and was present at the last International Veterinary Congress at The Hague.



HERR SCHMIDT, OF KOLDING, DENMARK.

Member of the Danish National Committee of the International Veterinary Congresses.



PROFESSOR W. L. WILLIAMS.

Professor of Surgery and Obstetrics in the New York State Veterinary College,
Cornell University, U.S.A.



JOHN G. RUTHERFORD, C.M.G., Hon. Assoc. R.C.V.S

Member of the Permanent Committee of the International Veterinary Congresses.

DR. RUTHERFORD formerly held the office of Veterinary Director-General and Live Stock Commissioner for Canada, a position he resigned in 1902.

During his administration he constructed a Government Veterinary Department where none previously existed, one which sends forth veterinarians properly trained to carry on the administrative work, to enforce the provisions of the law where necessary, to inspect meat intended for human food, and to grapple with the hundred-and-one problems associated with the diseases of stock; whilst skilled veterinary pathologists and bacteriologists deal with these branches of the work in a well-equipped laboratory.

His election to the Presidentship of the American Veterinary Medical Association was a direct proof of the esteem in which he was held by his American and Canadian *confères*. He is an Honorary Associate of the Royal College of Veterinary Surgeons, and has many friends in England who hope to welcome him on this side of the Atlantic.



A GROUP OF ENGLISH-SPEAKING DELEGATES AT THE HAGUE.
Ninth International Veterinary Congress.

THE TRADE EXHIBITION AT THE CONGRESS.

Not the least interesting part of this great gathering is the exhibition afforded by the specialities and commodities in general of the number of eminent commercial houses serving the profession in this country and abroad. Below we give a summarized account of the respective exhibits of some of these houses (space prevents us giving a fuller list), which we feel sure will be of interest and guidance to practitioners and others. Our foreign colleagues will, we feel certain, be particularly interested in this section of the gathering, as they will have a unique opportunity of seeing (many of them for the first time) the high measure of excellence attained by these British and other firms supplying the veterinary profession in this country. Every one of the houses mentioned in the following pages are personally well known to us, their commodities are always of the highest degree of excellence attainable, and in many cases their co-operation with the profession has been of immeasurable assistance to the latter.

Messrs. Baillière, Tindall and Cox, the well-known veterinary publishers, are exhibiting a collection of their recent publications which, for sterling worth and practical utility, are second to none. No other firm of publishers caters for the needs or meets the demands of the veterinary profession for good reliable books as does this publishing house. In their catalogue may be found works which have been invaluable to veterinarians both past and present, with titles almost as familiar as household words, books which have helped them, first in their student days and last, but not least, to carry on successful practice.

To glance through their catalogue containing such names as Fleming, Williams, &c., as authors of the past, and to examine their exhibit of books by present-day authors, such as Wallis Hoare, Hobday, Macqueen, Share-Jones and others, will afford an insight into the status of veterinary science at the present time.

Every veterinarian attending the Congress who is desirous of knowing all there is worth knowing concerning recent veterinary publications, should not fail to visit the exhibit of Messrs. Baillière, Tindall and Cox.

Among the various exhibits that will hold the attention of the profession is that of **Messrs. Burroughs Wellcome and Co.**

Those interested in serum and vaccine therapy are attracted by the "Wellcome" brand Mallein, Sera, Tuberculin and Vaccines.

These products are neatly packed in hermetically sealed bottles, with full directions as to dosage, &c., enclosed with each. They are prepared at the Wellcome Physiological Research Laboratories near London, under the supervision of a veterinary bacteriologist.

A product which presents novel features combined with great practical utility to the veterinary surgeon is "Vaporole" Iodine Tincture. This is a most ingenious method of carrying a solution of iodine ready for immediate application as an antiseptic before operation. The display of "Tabloid" Hypodermic, "Tabloid" Ophthalmic, "Soloid" Ophthalmic products, and particularly of "Soloid" Corrosive Sublimate, will excite great interest. "Soloid" Corrosive Sublimate is largely employed by the veterinary profession for the preparation of antiseptic douches, &c. It has been found of such value in the treatment of contagious abortion in dairy herds, that the New Zealand Government Department of Agriculture have recommended its use throughout the Dominion for pregnant cows which have prematurely slipped calf on previous occasions; also for cows which are repeatedly returning to the bull, and for the bull himself. Each product contains 8.75 grs. and one dissolved in a pint of water produces a solution of 1 in 1000 of corrosive sublimate.

Turning to the dietetic exhibits, attention is attracted by "Kepler" Malt Extract, and "Kepler" Cod Liver Oil with Malt Extract. These preparations are of considerable value for canine use. They are nutritious, and are specially useful for the feeding of puppies, for bitches after whelping, and for animals recovering from long and exhausting illnesses.

Charles Hearson and Co., Ltd., 68, Willow Walk, Bermondsey, London, S.E. Biological Incubators, heated by gas, oil or electricity and fitted with Hearson's Patent Capsule, which has superseded the old mercurial and thermostatic bars, for regulation of temperature. Sterilizers, heated by gas, oil or electricity. Electric Shakers, for shaking test tubes. Centrifuges, hand and electric, from 2,000 to 10,000 revolutions per minute. Autoclaves, heated by steam or gas.

Messrs. C. J. Hewlett and Son, Ltd., of Charlotte Street, London, E.C., have a very large and comprehensive exhibit comprising new drugs and special veterinary pharmaceutical preparations besides instruments.

Among the newer drugs are salvarsan, which has been recommended in contagious pneumonia of horses; fibrolysin for stenosis, ankylosis, and for removing fibrous tumours and adhesions. Tuberculol-bovo is a form of tuberculin where the reaction is obtained by instilling the liquid into the eye of the animal.

Nuclein, which in solution or injection has been found useful in many obscure diseases affecting the system by promoting the activity of the white corpuscles of the blood. Iodermiol, a non-staining iodine preparation, free from irritating effects ; useful in the treatment of rheumatism, spavin, ringbone, &c.

In addition to the older remedies, parophyroxia, lin. myrrh. benz. et saponis, oleum canthar. fort., mist. tonica conc., &c., and which have been used by more than one generation of veterinary surgeons, Messrs. Hewlett are exhibiting some new evaporating skin lotions, known as evapogens, useful in various forms of eczema and skin affections where ointments are unsuitable. A series of liquid malt preparations are also noteworthy. The "Magnum" pessaries have proved very useful to veterinarians as an improvement on the flushing system after foaling and calving. The teat bougies known as "Lactique" are made with an antiseptic base, the size of a milk syphon, and have been found most useful for inserting into injured teats, or after operating on a blind teat, to prevent closing of the milk duct. The "super-lactique" teat bougies have a fine cord running through each, so that the undissolved portion may be easily removed when required. Liquid ether soap is of undoubted utility in removing grease, dirt, &c., from the skin before operating and also for cleansing the hands of the veterinary surgeon.

A fine display is made of compressed tablets, capsules, physiologically-tested tinctures and liquid extracts, horse powders, dog powders, ear cones for dogs and cats, and numerous antiseptic preparations, among which special mention must be made of Messrs. Hewlett's creosalgen and surgical creosalgen.

The surgical instrument display is equally comprehensive and includes many novelties, besides instruments, such as Major Walker's milk fever outfit, C. T. Bray's set of firing irons, the Sutherland impregnator, manufactured by the company for some of their customers, new designs in drenching bits, mouth gags, aseptic pocket dressing instruments, the self-holding teat syphon, tooth rasps, &c.

Messrs. Hewlett and Son, Ltd., have published a new edition of their veterinary therapeutical notes on new preparations, which includes all their latest specialities, and a copy will be sent post free to any qualified practitioner.

Messrs. C. H. Huish and Co. of Red Lion Square, London, W.C., exhibit an exceptionally fine show of their well-known "Progressive" instruments amongst which we specially notice their Patent and well named "The Revelation" Equine Mouth Gag. This gag at its inception immediately became the universal instrument found in all the principal establishments throughout the kingdom, and has now

found its way to all parts of the world. It is in use in the Army, at home, and in India, Egypt, and South Africa. Their well-known "Certes" Inseminator, the pioneer of artificial insemination in this country is also on view together with many instruments of more recent introduction, amongst which the Record Precision Hypodermic Syringe, in sizes from 1 c.c. to 20 c.c., claimed notice—it is the last word in subcutaneous injection Syringes and has been adopted by the leading veterinarians and public bodies in this and other countries.

They also have a large display of canine instruments, amongst which must be noted Gray's Equine and Feline Mouth Gags, and Parturition Forceps. The bovine side of the profession is well catered for, as in addition to many kinds of Milk Fever Outfits, Teat Instruments of all descriptions were on view. Excellent Microscopes and Centrifugal Machines to cope with the Board of Agriculture requirements, were also on view. Not the least interesting of this firm's exhibit was the Biological Products of the Pasteur Vaccine Company, of Paris, whose sole British agent they are. It comprised anthrax vaccine, blacklegine, canine distemper vaccine, rat and mouse virus, mallein, streptococcus antitoxin, tetanus antitoxin, tuberculin, and others.

We must not close a review of their exhibits without mentioning "Vergotinine" a French remedy for the cure of broken wind, for which they are sole agents, and which has given marvellous results wherever tried. "Tallianine," another French product, must also be mentioned as it has been proved to be of excellent value in pneumonia, influenza and pulmonary congestions.

Huxley's Veterinary Preparations, exhibited by the Anglo-American Pharmaceutical Company, 59, Dingwall Road, Croydon. Milled ointments, devoid of grit for treating exemic forms, supplied in collapsible tubes with veterinary surgeon's own name and address, Flexible Worm Capsules and Liquid Vermifuges, Sulphuretted Potash in granular form in small, wide-mouth bottles for making mange washes, Cleansing Blocks for dry cleaning coats of dogs or cats, Fluid Soaps put up in bottles of various sizes, Metritis Pessaries for dogs, Dry Shampoo Powders for washing dogs, Quick-drying Fluid Shampoo for cleaning show dogs and small pets, Ear Conoids or Suppositories for canker, Antiseptic Pessaries for cattle, Teat Bougies, "Pultabs," powders lightly compressed, readily crushed or dissolved, supplied in glass tubes, Antiseptic Electuaries and Antiseptic Absorbent Plasma Dressing for treating inflammation, congestion and as a cleansing agent for wounds. Horses and Cattle Drenches and Powders supplied wrapped in envelopes with clients own name and address.

S. Maw, Son and Sons, veterinary instrument makers, 7-12, Aldersgate Street, London, E.C. This eminent firm have been makers of veterinary instruments for the last century. They are the sole contractors for the supply of veterinary surgical instruments to the Army Veterinary Department of Great Britain, and amongst their exhibits at the Congress are the following : Improved Record Hypodermic Syringe, graduated to 3 cubic centimetres for tuberculin test ; Centrifuges and Microscopes by Crouch—made at their own factories in Hatton Garden, E.C. ; Leather Wallets for Officers' Use, in coloured brown waterproof overall, as made for Professor Hobday ; improved pattern Bitch Forceps ; instrument for operation of stripping ventricles ; Swale's Patent Mouth Gag ; Burdizzo's Clamp for castration without cutting ; improved Brass Enema Syringe and Pumps ; army pattern Serum Syringes, Tooth Rasps and Balling Gun ; Thermometers, Syringes for Red Fever, Auto-cautery, Ecraseurs, Hoop, Testing Forceps, Tattooing Sets, &c.

Newton, Chambers and Co., Ltd., Thorncliffe, near Sheffield, display of Izal Disinfectant Fluid.

The unique feature of Izal Disinfectant Fluid, which is the pioneer of modern high-power germicides, is that it has been shown by a number of eminent bacteriologists to be at least twenty times as powerful as pure carbolic acid, while it is far less toxic and absolutely non-corrosive. It is an important qualification that Izal mixes just as readily in brackish and salt water as in fresh water without loss of germicidal power. Izal has a wide range of usefulness in both surgery and medicine.

Izal has been favourably adopted by His Majesty's Government, the Government of India, the Board of Trade, and many leading sanitary authorities throughout the Empire.

Izal Veterinary Fluid may be particularly recommended to the profession. It is a liquid, which, on being added to water, gives a fine white emulsion of high germicidal power. Izal Veterinary Fluid contains Izal oil, and also certain oils which have been found to be very active in the destruction of fleas, bugs, flies, mosquitoes and small insects generally. It may be described as the best disinfectant and insecticide of like power.

As a wash for horses and dogs, as an admirable disinfectant for stables, dog-kennels, poultry-runs, pig-sties, &c., as well as for influenza, strangles, and pink-eye, Izal may be safely recommended.

For dogs suffering from eczema, mange, fleas, irritation of the skin, parasite, canker of the ear, Veterinary Izal is extremely useful, and also for dealing with the diseases of bird life.

The proprietors have published an excellent little handbook about Izal, which is exceedingly useful.

Parke, Davis and Co. made a feature of veterinary biological products, prominence being given to phylacogens. These include Mixed Infection Phylacogen and Pneumonia Phylacogen, the first-named being used in the treatment of strangles, abscesses, fistula of withers, poll evil and suppurative conditions generally, while the latter is indicated in the treatment of all cases of acute and chronic pneumonia and its complications. The Phylacogens, which are administered hypodermically, may be described as modified bacterial derivatives and consist of sterile aqueous solutions of metabolic substances, generated by bacteria grown in suitable culture media. The metabolic products of the bacteria are separated from the bacterial cells by filtration through porcelain, and the bacteria-free filtrate with the addition of suitable preservatives constitutes the Phylacogen. The Mixed Infection Phylacogen, veterinary, is a polyvalent product prepared from mixed cultures, including the pyogenic staphylococci and streptococci, *Bacillus coli communis* and *Bacillus pyocyaneus*, of equine origin. In the preparation of Pneumonia Phylacogen, veterinary, mixed cultures, including pyogenic staphylococci and streptococci, *B. coli communis*, and *B. pyocyaneus*, of equine origin, are combined with cultures of diplococcus pneumoniae numerous strains of each organism being employed.

Vaccines in the form of hypodermic tablets and ampoules are prominent in their display. These include Colon Vaccine, Equine Influenza Vaccine (prophylactic), Equine Influenza Vaccine (curative), Staphylococcus Vaccine (combined), Streptococcus Vaccine, and Streptococcus and Staphylococcus Vaccine (combined). Perhaps the most interesting of the vaccines was one for the treatment and prophylaxis of canine distemper. The Prophylactic Vaccine is issued in sets of three bulbs, and is prepared from cultures of several strains of *Bacillus bronchisepticus* (Ferry), the specific micro-organism of canine distemper. The Curative Vaccine is also a polyvalent preparation, and, in addition to the *B. bronchisepticus*, also contains staphylococcus pyogenes albus, staphylococcus pyogenes aureus, and streptococcus pyogenes of canine origin. Canine Distemper Vaccine, curative, is supplied in sets of six bulbs, providing a series of graded doses for subcutaneous administration.

The firm are also exhibiting several veterinary sera, including Antistreptococcus Serum, Antitetanus Serum, and Influenza Antitoxin. Other biological products of which mention should be made are Antitetanus Dusting Powder, a prophylactic dry dressing for wounds suspected of tetanus infection, and Tuberculin, an absolutely trustworthy preparation made according to the original formula of Koch for the diagnosis of obscure tuberculous processes in cattle; Mallein for the diagnosis of glanders, and a new product, namely,

Mallein Ophthalmic Discs. The introduction of one of these discs into the ocular conjunctival sac will, if glanders is present, be followed in about eight hours by more or less lachrymation, and the formation of pus. Mention should also be made of the "Black-legoids," which have been used with such remarkable success as a prophylactic against quarter-ill.

Such well-known products as Acetozone, Adrenalin, Chloretone and Nuclein were also in evidence. This latter preparation is also being prepared in the form of Hypodermic Tablets, which are quite permanent, one tablet dissolved in 30 minims of water making a 5 per cent. Nuclein solution.

The list of exhibits made by this firm is hardly complete without reference being made to Pituitrin, the first extract of the infundibular portion of the pituitary body to be put on the market. The success which has followed the use of this product in cases of uterine inertia in the bitch has been very remarkable.

The list of products for local anæsthesia include Codrenine, a 2 per cent. solution of cocaine combined with Adrenalin, a special Veterinary Eudrenine containing 2 per cent. of eucaine hydrochloride combined with adrenalin 1-3000, and quinine and urea hydrochloride. This latter preparation is put up in the form of hypodermic tablets as well as in ampoules. The solution is reported to be fully equal to cocaine in analgesic power, and the anæsthesia is remarkably persistent; it is also non-toxic, and may be sterilized by boiling.

Fluid extracts, pills, hypodermic tablets of remarkable solubility, compressed tablets, and an excellent selection of veterinary medicine cases are other features of a most interesting exhibit.

The Sanitas Company, Limited, are exhibiting a complete range of their admirable preparations, naturally specializing in those which are particularly useful for veterinary use. They write to us as follows:—

"Sanitas" disinfectants are well known to veterinary surgeons. Every user of them knows that they are both economical and genuine. "Sanitas" disinfectants are also powerful deodorizers, which means that they purify, refresh and disinfect the air, at the same time that they kill or destroy the germs of disease existing in the atmosphere. "Sanitas" disinfectants are used in most of the large racing establishments in England, by selection of the cleverest breeders and trainers in the world. For the disinfection of stables "Sanitas Crude Fluid," diluted one part to fifty parts of water, should be sprinkled around when cleaning out the stable and occasionally sprayed on walls, ceilings, and the sides of the stalls. Sores, wounds, &c.: Apply "Sanitas Veterinary Ointment," which will make the affected parts heal very quickly and prevent any

inflammation, proud flesh, &c. Eczema, Mange, and other Skin Diseases : Wash with diluted "Sanitas Crude Fluid," or apply "Sanitas Animal (soft) Soap." Scratches : Cleanse the sore thoroughly with a brush, then rub in "Sanitas Animal (soft) Soap," and leave it on over night. In the morning wash off the soap with a damp sponge (use as little water as possible) and apply "Sanitas Veterinary Ointment." The horse can be worked during the day, and in the evening wipe off the ointment and rub in the soap again. Thrush : "Sanitas Hoof Dressing" will be found an excellent help. Its use in cases of thrush and brittle hoofs will be found invaluable. Fleas : The regular use of "Sanitas" in your kennel will keep fleas and similar pests away. If a dog should have fleas they can be destroyed quickly by using our "Sanitas Creocide." Wash the dog with a solution of one part of "Sanitas Creocide" to fifty parts of water and then rinse out the coat with a solution of one part of "Sanitas Crude Fluid" to one hundred parts of water. After a lapse of five days repeat this application. Poultry : Insanitary surroundings cause more disease, puny and unhealthy birds, and general loss in the poultry yard than all other causes put together. One frequently sees wet yards, a leaky house, and masses of decaying vegetable and animal matter left indefinitely to spread disease. Healthy birds can be produced only in healthful surroundings. An absolutely non-poisonous disinfectant is a necessity in the poultry-run and pigeon-cote, and the "Sanitas" Disinfectants, if used regularly and intelligently, will pay for themselves in a very short time.

Stop disease from getting a start, kill the germ at once, do not wait until it has got hold of the flock before using sanitary measures. This is much the cheapest and by far the kindest and most satisfactory way of proceeding. The "Sanitas" Disinfectants meet all requirements and give to the atmosphere oxygen in its most active form, whereas the coal tar preparations actually rob the atmosphere of its vital oxygen, are more or less poisonous and should not be used around the birds.

H. Trommsdorff, Chemical Works, Aix-la-Chapelle. Selling agents in London, Messrs. C. Zimmermann and Co., 9 and 10, St. Mary-at-hill, E.C. "Bissulin" is a therapeutic agent for the treatment of infective vaginal catarrh. It is an odourless substance consisting of various fats with the addition of "Sozodol"-hydrargyrum. In cool or cold weather the cases should be opened and placed in a warm room for twenty-four hours before use, for "Bissulin" should never be used cold, otherwise it is hard to apply, for it melts too slowly and occasionally gives rise to discomfort and straining in the animals. "Bissulin" is only supplied to veterinary surgeons or to their order.

The eminent firm of **Willows, Francis, Butler and Thompson**, so favourably known throughout the veterinary profession in the United Kingdom, has a very effective exhibition. Among the preparations shown to practitioners are the following :—

Colodyne : a very effective preparation for the treatment of colic in horses, especially if accompanied with impaction and flatulence. Colodyne being itself a cathartic, in addition to its cordial and analgesic properties, no other purgative should be given with it. Dose : three to five fluid ounces. **Iodotan** : this is a preparation of iodine combined with tannic acid, and its use is indicated in all those cases where the drug is to be externally applied. It is claimed for iodotan that, in it, the iodine is presented in the form most readily absorbed, and at the same time it is deprived of its staining qualities. **Nuclein injection** : Nuclein, a natural product existing in certain animal and vegetable substances, has a very marked effect in increasing the leucocytes in the blood of animals, thus assisting them to withstand the attacks of certain diseases due to bacterial infection. The injection is supplied in sealed flasks of one dose each in boxes. **Pethdar** (for veterinary use), a valuable tonic for dogs, composed of extract of meat with wine, extract of malt, iron, phosphates of lime, soda, &c. Dose : one to four drachms, according to size of dog, three or four times a day. **Plasmul** : this new preparation for external use in place of the old-fashioned crude poultices, counter irritants, &c., in the treatment of inflammation and congestion of all kinds. **Plasmul Dusting Powder**, an absorbent and antiseptic dusting powder useful for ulcerated surfaces, fissured heels, saddle galls, sore withers, &c. **Terpinol Fluid** (Mackey's) : for use as a deodoriser and disinfectant in racing and other stables where valuable horses are kept. It is non-poisonous, and the delightfully exhilarating smell which it gives off cannot but contribute in no small degree towards the attainment of the highest pitch of health and vigour. For washing stable floors, drains, &c., it is diluted in the proportion of one part of terpinol to forty parts of water.

VETERINARY SPECIALITIES. **Anasthene** : A local æsthetic for injection in minor operations on horses, cattle, dogs, &c. **Antiseptic Dusting Powder** (white or pink) : A faintly perfumed dusting powder, formed of pure starch and rendered antiseptic and healing by means of the addition of boric acid and oleate of zinc. In special dredgers holding 2 oz. and 4 oz. **Antiseptic Rubber Bandages**, waterproof, black or brown, 4 yd. long, 3 in. wide. **Red Blister** : An efficient combination of biniodide of mercury and cantharides. **Green Blister** (non-irritant) : This blister is now in constant use in several racing stables, and gives universal satisfaction. It is prepared solely by a special process from

cantharides, and contains no other active ingredient. Put up in rolls of $\frac{1}{2}$ lb. each, and prepared with a basis of gutta-percha, so as to obtain the maximum degree of rigidity and power to set quickly. Chlorodyne: This valuable preparation is too well known to need much description here. Its use is indicated in all cases of severe abdominal pain, in diarrhœa, dysentery, chronic cough, muscular rheumatism, &c, and in tetanus its use has been attended with considerable success. A similar preparation to the above can be had red, green, or colourless. Chlorodyne Miscible (red, green, or brown): This is an excellent preparation for dispensing with gruel, water, or any aqueous mixture. Dog Shampoo: Prepared either with eucalyptus or creseptol. A liquid dog soap. Removes odour, destroys parasites. Dry Shampoo (for toy dogs): This is an excellent preparation for cleaning the coats of toy dogs. It also imparts a silky appearance and a delicate perfume to the hair. Glycerol Heroin (veterinary) (with licence of the owners of the word-mark: Each fluid dram contains $\frac{1}{16}$ gr. of heroin in combination with 3 gr. of hypophosphites of sodium and potassium, associated with 15 minims of tincture of hyoscyamus. This forms an immediate palliative and curative remedy if given for some little time. Glycerol Thymol Alkalina: Antiseptic and deodorant. Lin. Alb. c. Methyl Salicylas (green): This liniment will be found of great value in the treatment of rheumatism, sore throats and shoulders, and sprains. Liq. Antiseptica Fort.: A mercurial compound of almost universal application for poll evil, fistulous withers or quittor, bony enlargements, ulcers in throats of beasts, ringworm, thrush in horses' feet, grease and granulations; also as a lotion for general purposes, foul wounds, &c., for hæmorrhoids, and as an antiseptic for washing the hands for operations. Mist. Bismuthi Comp: An elegant preparation of bismuth for canine practice, each fluid $\frac{1}{2}$ dr. representing: tr. nuc. vom., minims viii; acid. hydrocyan. P.B., minims ii; morph. mur. $\frac{1}{24}$ gr.; liq. bismuthi, 1 dr.; associated with chloroform and aromatics, and coloured as tr. card. comp. Mist. Bismuthi Comp. c. Pepsin: Each fluid $\frac{1}{2}$ dr. representing: tr. nuc. vom., minims viii; acid hydrocyan. P.B., minims ii; morph. mur., $\frac{1}{24}$ gr.; liq. bismuthi, 1 dr.; pepsin porci, 3 gr.; associated with chloroform and aromatics, and coloured as tr. card. comp. Mist. Colicis Aromat. Aper.: An aperient "Bowel Tonic," free from the constipating effects of opium, and the super-purgation induced by aloes. Indicated in colic, tympanitis, impaction, &c. Powerfully anti-spasmodic, sedative and carminative. Mist. Tonic Virid Colic. (liq. ferri et quininæ cit.): Each fluid dram contains 10 gr. of citrate of iron and quinine. It is in the form of a bright green solution and mixes perfectly with water. Plasmatine: For use in place of

poultices in cases of congestion and inflammation. Apply warm to the affected area, and cover with any convenient dressing or bandage. Ruscol (registered trade mark): An organic compound of bismuth and birch-tar. This ointment has been found most successful in cases of eczema, erysipelas, and all skin diseases, either itching or inflammatory. A superior ointment for fancy dogs. Pulv. Iodoformi Co. An antiseptic dusting powder. "Wylettes": "Wylettes" are hermetically sealed sterilized glass capsules of dark amber-tinted Jena glass, containing 1 cubic centimetre of a sterilized liquid ready for immediate hypodermic injection. Any combination can be made. Horse Balls: Elegant veterinary pharmacy. Horse and Cattle Powders, Drenches, Dog Pills (gelatine or pearl-coated), "Little" Pill Series, for dogs, Flexible Gelatine Dog Capsules.

Messrs. Zimmermann and Co.—Aphrodine is extensively used in veterinary practice as a specific in sterility and impotence. It presents none of the toxic properties of such remedial agents as strychnine, cantharidis, phosphorus, &c., and can therefore be used with less risk or injurious after-effects. The first systematic use of this remedy in veterinary practice was made by Holterbach; since then it has been subjected to severe tests, and the reports of its efficacy from numerous sources are characterized by unequivocal praise.

The fact that Aphrodine is not to be regarded as a poison—but that if administered in suitable doses it is harmless, even if its use is continued for a long time—has been proved beyond doubt after extensive investigations. It is therefore non-cumulative, and when its action is spent the condition of the animal returns to the normal state. Injections of aphrodine chloride repeated daily for four weeks were not followed by any injurious consequences whatsoever.

The results obtained in practice prove the preciseness of its efficacy. Originally one was often of opinion that a specific had solely an effect upon the unhealthy organism, leaving the healthy constitution almost unaffected, and furthermore, that its efficacy could only be observed on males and not on females.

Another distinct advantage owned by Aphrodine is that it acts with equally good results in both sexes.

TENTH INTERNATIONAL VETERINARY CONGRESS,
LONDON, 1914.

To the Editor of THE VETERINARY JOURNAL.

July 16, 1914.

DEAR SIR,—For your information I beg to enclose herewith a letter which I have received from the Secretary of the Permanent Committee and of the Ninth International Veterinary Congress at the Hague, containing an account of the Receipts and Expenditure of the Ninth Congress, for publication.

Yours faithfully,

STEWART STOCKMAN,
Honorary Secretary.

SECRETARY'S OFFICE OF THE PERMANENT COMMITTEE FOR THE
INTERNATIONAL VETERINARY CONGRESSES.

The Hague, July 13, 1914.
Stationsweg 74.

MY DEAR COLLEAGUE,—Enclosed I send you the account of the Ninth International Veterinary Congress at The Hague in 1909, examined by the Commission appointed in the closing meeting. By the unexpected death of the treasurer, Professor Van Esveld, afterwards succeeded by Dr. H. Remmelts, at The Hague, it was impossible to make up the accounts in the time indicated in the Statutes.

In a note I have mentioned that the Dutch Government has accorded an extraordinary subvention for the installation of the Permanent Secretary's Office at The Hague.

In view of 49 of the Statute I beg you to publish the accounts in the veterinary periodicals of your country.

With very kind regards,

Yours faithfully,

(Signed) D. A. DE JONG,
Secretary of the Permanent Commission
and of the Congress at The Hague.

Sir Stewart Stockman,
Laboratory of the Board of Agriculture and Fisheries,
Alperton Lodge, Wembley, S.O., Middlesex.

ACCOUNT OF THE NINTH INTERNATIONAL VETERINARY CONGRESS,
AT THE HAGUE, 1909.

<i>Expenses.</i>					12 Guilders = £1. Guilders.
Printing of reports, &c.	...	...	...	...	17,363'14½
Translations	...	...	...	...	767'62
Reports of meetings, stenography	...	...	...	...	1,861'22½
Offices	...	...	...	...	2,423'05½
Postage, telegrams, despatch	...	...	...	...	2,243'18
Travelling and lodging expenses	...	...	...	...	782'00
Collection of amounts of subscription	...	...	...	...	108'94½
Remittance	...	...	...	...	44'38
Receptions, entertainments, secretary's office, administration	...	...	...	...	12,759'44½
Excursions	...	...	...	...	1,871'14
Reception on the occasion of the Inauguration of the Thomassen Monument	...	...	...	...	201'71
Restitution of subscriptions	...	...	...	...	21'50
Permanent Committee	...	...	...	...	516'99½
Unexpected expenses	...	...	...	...	225'71
					<hr/> 41,190'05

<i>Receipts.</i>					
1,478 ordinary members	...	...	...	...	14,780'00
84 extraordinary members	...	...	...	...	420'00
194 lady members	...	...	...	...	485'00
Subvention of Dutch Associations	...	...	...	...	3,497'95
Transvaal Veterinary Medical Association	...	...	...	...	120'15
Department of Agriculture of South Africa	...	...	...	...	38'05
Printed papers	...	...	...	...	167'40
Interest	...	...	...	...	774'84
Unexpected receipts	...	...	...	...	32'80
Subvention of the Dutch Government	...	...	...	...	20,873'86
					<hr/> 41,190'05

N.B.—Extraordinary subvention of the Dutch Government for the installation of the fixed Secretary's office at The Hague, 2,626'14 guilders.

"VETERINARY SURGEONS' INDEMNITY."

A New Era of Insurance for Veterinary Surgeons.

BY A. LAURENCE BENTHALL, *Insurance Expert.*

INSURANCE to-day has been brought to a fine art, new schemes for the benefit of the insuring public have been put on the market, but although special schemes have been inaugurated, nothing has been yet arranged for veterinary surgeons.

For personal accident they are classed at the highest rates, and their Workmen's Compensation risks are looked upon as of a very hazardous nature from the underwriters' point of view.

To-day the profession can effect no cover against their legal liability, caused by accident or negligence of the surgeon or his assistants.

It is therefore with a view of benefiting the profession that the VETERINARY JOURNAL has been able to arrange a new insurance exclusively for its subscribers.

NATURE OF INDEMNITY.

It is felt that claims have very often been made by clients alleging injury to their animals whilst in the care of the surgeon, and although some of these allegations have not materialized in law, they have caused the surgeon endless worry, trouble, and expense in defending such actions.

The manager of the JOURNAL has had the opinion of leading gentlemen in the profession, and he has come to the conclusion that the indemnity must cover claims by clients against legal liability for injury to animals under treatment caused by accident or negligence of the surgeon or his assistants; further, also against all sums for which the surgeon may become legally liable in respect of personal injury by accident occurring on the premises of the practitioner, by any person other than in his employ. The indemnity covers also accident or negligence in the treatment of medical cases, such as mistakes in dispensing medicines, or through errors arising from the administration of wrong drugs.

SECURITY OFFERED TO SUBSCRIBERS OF THE JOURNAL.

The JOURNAL is very fortunate in obtaining a policy of such a comprehensive nature from the British Equitable Assurance Co., Ltd., which was founded in the year 1854, and has built up its reputation by generous settlement of claims, and to-day it enjoys one of the premier positions in the Insurance World. Its total funds exceed £1,700,000, and it has paid in claims over £4,439,000 since its formation.

CLAIMS.

It has on innumerable occasions been recorded that claims have arisen, in spite of every care and attention, with members

of the profession, and it must not be forgotten that they are responsible for the negligence of their assistants, by whose neglect they become legally liable.

It must be also noted that other highly important and qualified professions have at the present time such indemnities in existence; in fact, the medical and dental professions have an indemnity of this kind, and chartered accountants avail themselves of a policy to limit their liabilities under this heading, so it is clearly shown that these professions have thought of the possibility of such contingencies arising.

RATES.

The question of rates, which would not only appeal to members of the profession, but would also leave a small margin of profit to the underwriters; was a very important point.

The JOURNAL is pleased to announce that the above-mentioned company has undertaken the risk, for one year at least, at exceptionally low rates of premium. For instance, the cost of an indemnity for £250 any one claim is 15s.; for £500 any one accident is 20s.; the number of accidents is unlimited in any one year. Furthermore, it must not be overlooked that all legal expenses arising out of any actions for damages are borne by the company.

SUMMARY OF THE INSURANCE.

After very careful consideration I consider the cover offered at the rates charged is very reasonable; after all, the policy is one which leaves very little ground uncovered, and it is hoped by the Manager of the JOURNAL that members of the profession will see the importance of the insurance, and will avail themselves of the scheme to ensure its complete success. As I have stated earlier in this article, this is a new insurance, and although it would be difficult to give full particulars of claims which have been made at various times on members of the profession, it has been shown that there is not a doubt that claims have been made, and I think it will be agreed on all sides that the JOURNAL has taken a step in the right direction in obtaining a policy from such a company and resource. Not only have we to remember the possibility of bogus claims which are made, causing great expense in defending such actions, but we must pay very careful attention to the possible negligence of assistants; I think I touch on a very important point in the whole indemnity, and I feel sure it will be readily seen that a great risk lies in this connection on members of the profession.

The profession as a whole are noted for the extreme care they exercise over their operations; it is noted that sometimes even when care is exercised to its fullest extent accidents of every kind happen.

As an expert of some years' experience, I can safely recommend the indemnity as one of a sound nature, and it should, I think, provide a long-felt want among the profession generally.

THE VETERINARY JOURNAL

SEPTEMBER, 1914.

Editorial.

THE ARMY VETERINARY OFFICER AND THE HORSES IN WAR TIME.

At the present moment, when everyone is talking of the war, we in our profession can legitimately point with pride to the manner in which our members have unselfishly and ungrudgingly responded to the call of duty. In the Regulars the value of the Army Veterinary Corps is well established, but this is the first real call which has been made upon the Territorial Veterinary Officer, and already his value and the value of the Departmental system arrangement has been made clearly apparent.

Our men have, one and all, responded to the call of duty, leaving lucrative positions or busy practices, often without having been able to find a *locum tenens*; and in no branch of the Department has there been a lack of volunteers. The mere civilian, too, without even the dignity of Army rank or the glory of a uniform, has proved his usefulness; and whether as examiner of Remount purchases, as Civilian Veterinary Surgeon attached to a regiment or to a veterinary hospital, or in charge of horses on a transport ship, his advice and skilled knowledge has saved the country hundreds of thousands of pounds.

To anyone who has watched the evolution of the Army Veterinary Corps and the development from the days of George Fleming under the Regimental system to the present Departmental and Hospital scheme, the progress made seems marvellous, and it is no exaggeration to say that the methods adopted by the British Army for the care and treatment of its sick and wounded horses can compare favourably with any country in the world. The Field Hospital system, supported by hospitals on the lines of communi-

cation and at the base, gives results in relieving the sufferings of the horses, which are as good as can possibly be obtained, and for those in agony or disabled past repair the veterinary officer and his staff of trained assistants have means at hand for a speedy and painless end.

It is hard for a mere layman to understand why those who are engaged in the work of mercy should not be placed under the protection of the Red Cross, and we feel that the efforts which have from time to time been made in this direction must eventually be crowned with success.

That the veterinary service is considered efficient is still further proved by the fact that the military authorities have firmly decided that on no account will they permit any private volunteer body of persons to enter the sphere of hostilities for the purpose of destroying wounded horses. That they are wise in this is beyond question, and their decision is a source of satisfaction to the profession in general, and a great compliment to our military colleagues, and the organization they have worked so hard to place in its present state of efficiency.

THE HORSE SUPPLY IN WAR EMERGENCY.

THE rapidity with which the horse supply has been furnished for the present war has been a great compliment to the system at present on its first great trial.

Not only were the necessary horses furnished within a few days, *but the animals obtained were fit and ready to take the field at once.*

Ever since the lesson of the South African War the Government have worked out a scheme whereby every owner of horses was registered, and to those who voluntarily agreed a certain sum (equal to the average value of the horse in the stud) was agreed upon as a purchase price in the event of an emergency occurring. The owner then registered whatever proportion of his stud he thought he could spare, receiving in return in peace time a Government grant of a certain sum per horse per year. In time of war (or at the present moment) the owner is called upon to furnish, at a few hours' notice, all the horses he has promised to supply.

These are selected by a Remount Purchasing Officer accompanied by a Veterinary Officer, who examines and proves them, and the matter ends for the moment.

In the event of more being wanted the two officers return to the

owner, accompanied by a policeman, and present a "Requisition" warrant, compelling him to produce and sell a further number of his stud, the price for these being agreed upon between the Purchasing Officer and the seller.

In the present instance the Regular Army had its ranks filled up within a week, and the Territorials were all supplied about ten days later. The advantages of such a system has been well illustrated during the present mobilization.

Instead of a lot of unruly young, unfit horses, who do not take kindly to their work, the Government obtains without trouble and at a reasonable price a large number of adult well-seasoned horses, all *at once* able to carry a man or go straight into harness.

The scheme has been well thought out, the mobilization of the horses and transport passed off without a hitch, and to those who were the originators of the scheme we of the profession, whose work brings us in daily contact with horses and their owners, cannot but wish to add our meed of praise.

THE DISAPPOINTMENT OF THE INTERNATIONAL CONGRESS.

GREAT and bitter has been the disappointment of the members of the International Veterinary Congress which, through circumstances over which we had no control, has been a total failure. Had the German Kaiser waited only a month or two longer before letting loose the dogs of war how different it would all have been! We in Great Britain are able to say that no stone had been left unturned to give our Continental colleagues a hearty English welcome, and they on their part were looking forward to a record Congress in this, the jubilee year.

Every civilized country of the world had delegated its representative and the August number of THE VETERINARY JOURNAL gives a fair idea of the cosmopolitan nature of the gathering; but when the Germans and Austrians came not, and our near neighbours the French too stayed away, it was known that something serious was in the air.

Some of our Dutch *confrères* arrived on Saturday and returned on Sunday. The Norwegians, Swedes and Danes returned on Monday, the officers of the British Army (both Regulars and Territorials) were told to hold themselves in readiness on Tuesday, and

on Wednesday Sir John M'Fadyean, the President, who had (with his committee) worked so hard for the success of the whole affair, decided to bring the Congress to a conclusion. Were it not for the great expense of the whole thing, which would have to be repeated, we Britishers would even yet like the opportunity to show hospitality to our colleagues from abroad, and to have it held here again when peace becomes established.

Perhaps this idea may yet be considered, and, if so, perhaps several other countries may unite with us in bearing the financial burden; for though the nations are at war, true science knows no international differences, and when on veterinary matters for the benefit of animal life there is only one common thought at the bottom of it all, and that is how to successfully combat disease.

Disease is the universal and common enemy and against this we are united; it is only in our methods of attack whereby we differ, and the fiercest controversialists in the lecture room will afterwards set all their differences on one side and be the best of social friends. It is in this manner that congresses promote friendships, and we in England should much like the thought to be with us that many friendships had been made or renewed on British soil. However, we shall see what we shall see!

Personal.

AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1912.

EXTRACTS FROM PRESIDENTIAL ADDRESS BY PROFESSOR T. W. EDGEWORTH DAVID, C.M.G., B.A., F.R.S., Hon. D.Sc.Oxon.

" . . . THE action of the Federal Government in organizing the recent scientific expedition to Northern Territory, in which Professors Gilruth and Spencer, Professor Woolnough, and Dr. Breinl took part, will doubtless highly commend itself to the general public, no less than to workers in science. The reports already furnished all show that the Northern Territory has far greater possibilities than probably most of us ever imagined in regard to both its pastoral and mining future. . . ."

"Those who have the privilege of knowing Professor Gilruth intimately will have every confidence that he will prove himself—indeed, he has already proved himself—an able and successful administrator, and this Association is surely grateful to the Federal Government for having placed our colleague in so high and responsible a position."

General Articles.

ABNORMALITIES OF THE SEXUAL GLANDS OF MAN AND HORSES.*

By SIR JOHN BLAND SUTTON, F.R.C.S.

Surgeon to the Middlesex Hospital.

Few things in the operating theatre arrest the attention of the medical student more forcibly than seeing, for the first time, a dermoid of the ovary or of the testicle. The mode of origin of these extraordinary tumours has never been clearly explained, but our knowledge in regard to their occurrence in men and women, horses and mares has been advanced by the enterprise of surgeons and veterinarians. Formerly our knowledge of dermoids of the genital glands was obtained from observations in the *post-mortem* room, and the descriptions were brief and insufficient. The establishment of ovariectomy proved the frequency and importance of ovarian dermoids; some of the largest tumours found in women are dermoids. Careful examination of early examples, removed during life, have shown that they arise in the oöphoron or egg-bearing segment of the ovary. Gradually it was recognized that the essential part of an ovarian dermoid is the small organized body known as the embryonal rudiment. The grease, hair, epidermic cells, and teeth which fill the cyst are waste products shed by the skin covering the embryonal rudiment. This curious body of varying complexity is now regarded as an imperfectly developed ovum, thus harking back to the opinion held by our predecessors that the ovarian dermoid is due to parthenogenesis. The remarkable experiments of Bataillon on the eggs of the grass frog help to support this view. Bataillon found that by puncturing virgin eggs with very minute metal stylets carefully sterilized, segmentation could be initiated. He succeeded, after puncturing 10,000 eggs, in producing three tadpoles. Eggs punctured by his stylets always segmented, but the development became arrested just short of the tadpole stage.

It is reasonable to believe that the ovarian dermoid or embryoma, is an ovum that has been started into activity by some

* This article was written specially as a chapter for the Second Edition of "Castration (including Cryptorchids and Caponing) and Ovariectomy." Published by W. and A. K. Johnston, Edinburgh.

pathological cause, but not by a spermatozoön. Ovarian dermoids in mares are rare. I have only had an opportunity of examining one specimen. The hair in it was like that on the mane or tail. In women the hair in ovarian dermoids is like that on the head or on the pubes, but it rarely agrees in colour with that of its host.

There is a rare, but extremely malignant form of ovarian embryoma, distinguished as malignant teratoma of the ovary. Such a tumour is solid and consists of a conglomerate of fetal tissues, skin with developing hair, sweat and sebaceous glands; developing teeth, brain matter, neuro-epithelium, and cells, resembling choroidal pigmented tissue. These tumours arise mainly in girls and young women and give rise to secondary deposits in the peritoneum. They quickly destroy life. If removed they recur rapidly. Examples of malignant teratomas have not been recorded in mares. Cystic tumours of the ovary are common and, as in women, benign.

TESTICULAR DERMIDS.

Dermoids of the testicle are rare in man, especially if this term be restricted to tumours containing hair or teeth. It was formerly customary in text-books of surgery to state that dermoids of the testicle are common. British surgical and pathological literature of the last thirty years contains reports of six cases of testicular dermoids, and of these two came from China and one from India. There is a tendency to widen the definition of the term dermoid or embryoma of the testicle so as to include some growths of the testis commonly called "general cystic disease," and this is probably correct. Mr. Hobday has afforded me opportunities of examining several excellent and fresh specimens of testicular dermoids removed from horses. This shows that such tumours are fairly frequent in horses, and it is remarkable that all occurred in undescended testicles.

Testicular dermoids in man and horses are always unilateral; ovarian dermoids are often bilateral. Like the typical ovarian dermoids, such a tumour connected with the testis of a horse consists of a solid portion, the embryonal rudiment lodged in a cyst packed with grease, epithelium and shed hair. The hair and the teeth are equine in character. The relation of the dermoid to the testicle is peculiar; it does not grow in the secreting tissue of the testis but arises in the body known as the paradidymis,

between the true testis and the epididymis. The paradidymis is composed of vestiges of the gonad, the embryonic organ or *anlage*, from which ovary and testis are derived.

I have long suspected that the source of testicular dermoid is unsuppressed ovarian tissue in the paradidymis. This opinion is supported by the observations of Pick and others that the sexual glands of human pseudo-hermaphrodites are liable to become the seat of embryomas.

Testicular dermoids of horses are interesting in another aspect. The majority arise in undescended, or imperfectly descended testes; a dermoid in an undescended testis in man is extremely rare. I only know one recorded instance. The abdominal testis in man is liable to tumours, but they are invariably sarcomatous.

There is a remarkable difference in the undescended testes of horses and men. There is evidence that in horses testes retained in the abdomen, or in the inguinal canal, contain spermatozoa. In man this is rarely the case; in him retention of the testis is often associated with inguinal hernia; it is a matter of safety and increases the chance of success if an imperfectly descended testicle is removed in the course of an operation for the cure of an inguinal hernia. There should be no hesitation in removing such an organ; after careful observations extending over many years I only once found spermatozoa in an undescended testis. It is commonly believed that the imperfection of an undescended testicle is due to its failure to reach the scrotum. This I believe to be an error. *An undescended testis fails to reach the scrotum because of its imperfection.*

THE EFFECTS OF CASTRATION AND SPAYING.

It is the experience of stockyards that the removal of the sexual glands in young animals is followed by an increased formation of fat and bone. This corresponds with the observations that adult eunuchs are usually gross and fat. Physiologists and anatomists have been puzzled by the discovery that the hypophysis (pituitary body) influences the growth of the body and the development of the sexual characters in a remarkable manner. Inefficient function of the hypophysis in men and women leads to excessive deposition of fat, loss of sexual power,

and the genital organs revert to an infantile type. The term "pituitary eunuchism" has been suggested by Shattock for sexual inability in men due to this cause. When the hypophysis enlarges in adolescents, the bones grow excessively and they become giants. If the hypophyseal changes occur after the obliteration of the epiphyses, the characteristic changes of acromegaly (big ends or points) occur. It is remarkable that abnormal development of the hypophysis influences men in the same way as complete castration. It is worth attention on the part of veterinarians to determine if there be any definite changes in the hypophysis of the horse, mare, ram, ewe and sow associated with gelding and spaying.

The effect of removing the ovary and testes from ostriches is a matter of importance to naturalists and physiologists interested in the abnormal manifestations of the sexual characters, primary and secondary. It is well known to gamekeepers that hens which have ceased to lay eggs sometimes assume the plumage more or less completely of the cock. Such cock-feathered hens have an atrophied ovary. One of my most remarkable examples was a hen Japanese pheasant, *P. versicolor*. The metallic coloured plumage being very striking, I secured the body of the bird at its death for the museum of the Royal College of Surgeons, England. In all the specimens I have examined an atrophied ovary has been found. Some observers are not satisfied with this explanation. The experience of South African farmers supports it, for the feathers of caponized ostriches are finer, cleaner and heavier than those ostriches which retain ovary, or testes, as the case may be.

In view of the discovery that the hypophysis and the adrenals (suprarenal capsules) influence the sexual functions and the secondary sexual characters, veterinary surgery, which is making such progressive strides, could add to this knowledge by investigating the gross and microscopic features of the hypophysis and the adrenals in caponized ostriches.

No comparison can be made of the effects produced by the removal of the ovaries in women with those observed in mares. Surgeons have fortunately never contemplated the removal of these organs to control vicious habits, erotomania, bad or incompatible tempers. The only approach to such measures has been bilateral oöphorectomy in epileptics, but this is rarely practised and has never received professional endorsement.

THE VETERINARY PROFESSION IN BELGIUM.

BY DR. DUPUIS.

Director of the State Veterinary School.

THE practice of veterinary medicine in Belgium is regulated by the law of April 7, 1890.

All veterinary practice throughout the kingdom is limited to those who have been admitted to the profession in accordance with the stipulation of this law.

The course of studies at the School of Veterinary Medicine lasts seven years, the students being divided into four classes.

Before admission, prospective students must have taken a degree in natural science. This degree is only obtainable after six years' work at the Greco-Latin "humanities," including two years at a university on the science side.

Veterinary surgeons who fulfil all the conditions of the law are placed upon a list, which is published every year. They are all recognized by the Government, and they only can be employed by the authorities, both civil and military. They are also authorized to dispense drugs as required for the treatment of animals which are confided to their care.

Every veterinary surgeon can demand recognition from the Government, but there are also various special categories of veterinary officers as follows :—

(a) Veterinary inspectors, numbering eighteen, of whom one is attached to the Agricultural Department and another to the Minister of the Interior ; the others are attached to particular districts, where their activities have full scope.

(b) Supplementary veterinary inspectors.

(c) Adjutant veterinary inspectors.

(d) Supervisors of imported animals and of those which are on the way to the frontier or to authorized ports.

(e) Recognized veterinary surgeons.

(f) Provincial and communal veterinary officers.

The respective duties and powers of all these officials are determined by royal decrees and consequent ministerial enactments. They have to carry out all the laws and regulations which appertain to sanitary restrictions regarding domestic animals and to hygiene in general.

Out of a population of 7,500,000 inhabitants Belgium can count

more than 750 veterinary surgeons, excluding military veterinarians, who number 60.

Throughout the various provinces of the kingdom there is a superabundance of practitioners. Even though meat inspection is almost exclusively in their hands the consequences of this professional overcrowding are more and more evident, especially as motoring increases. It is to be hoped that in future there will be other openings for the profession, such as follow on the multiplication of abattoirs and a more thorough inspection of dairies and their produce.

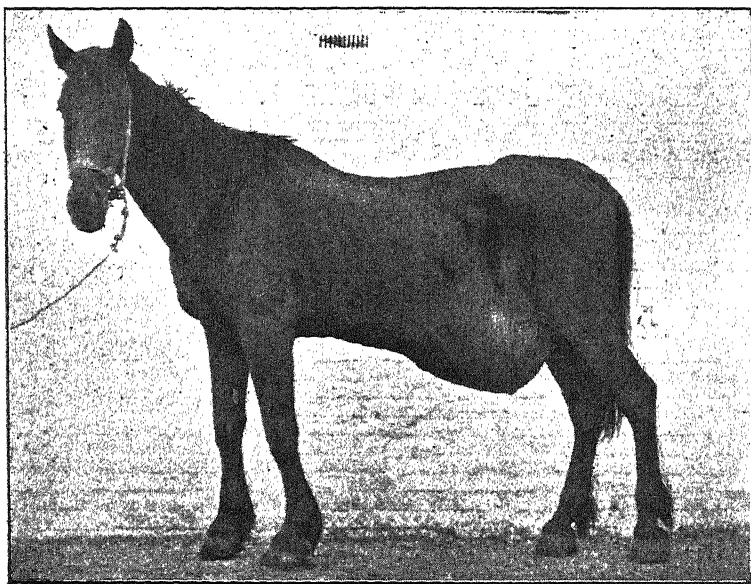
Clinical Articles.

A VERY LARGE VENTRAL HERNIA IN A MARE.

By G. S. THOMAS, M.R.C.V.S.

Chichester.

THE subject of the illustration was a bay carriage mare, about 15 or 16 years old, and pregnant when the rupture appeared. Notwithstanding its size she foaled down all right, although she suffered a very great deal of pain during the act of parturition.



A large ventral hernia.

The foal lived for fifteen days and as the mare was useless for work and had a tremendous amount of milk, and the owner did not wish to take any trouble over her, she was destroyed. The edges of the muscle of the abdominal wall appeared on *post-mortem* examination to merge indistinguishably into the skin and it was really astonishing that she had managed to foal down at all. The case was quite inoperable.

ON THE EXPULSION FROM THE HORSE OF A
URINARY THROMBUS CLOSELY RESEMBLING A
WORM.

By A. W. NOEL PILLERS, F.R.C.V.S., F.Z.S.
Liverpool.

On August 16, 1912, I received from Mr. F. H., F.R.C.V.S., an 8-oz. medicine bottle containing several pieces of slate red material preserved in spirit. In his accompanying letter he said:

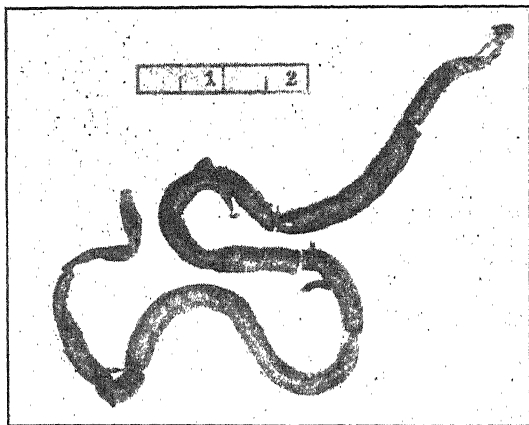


FIG. 1.—The damaged portion of clot with an inch scale. The original measurements have been mentioned in the text.

"I enclose a worm which has been sent to me with the rather curious history that it had come away together with about half a pint of blood from the bladder of a gelding after urination. . . . I should be glad if you would examine it and give me your candid opinion as to what you think of it. Personally it looks to me like the ordinary *Ascaris megalocephala*, but the veterinary surgeon who sent it is so absolutely sure on the point that I do not like to contradict him without being backed up by someone else."

I then wrote the owner of the specimen, Mr. W. J. C., F.R.C.V.S., and in answer to my queries he replied on August 18, 1912: "The history of the case is as follows: An aged vanner was standing in the street in harness when he was noticed bleeding from the penis. In a few seconds the worm escaped from the urethra; it was then alive and brought back to me. The horse was walked to my yard about two miles, and while there passed a large quantity of blood. For twelve hours the urine was blood-stained, but no other symptoms have been noticed. When fresh the worm measured 18 in. in length, and was 1 in. in circumference at the thickest part. . . . Am sorry the specimen was in such a bad state. It is quite six weeks since I sent it to H."

In answer to a further letter, W. J. C. replied on August 24, 1912: "The colour of the worm when voided was red from adhering blood clots, but when washed was yellowish white. The ends were similar to those of the large ascaris. The preservative was for about a week formalin, and it was then put in spirit."

I examined the material, and made sections, which showed that the structure had been derived from blood. On communicating this to W. J. C., I received the following letter, dated October 20, 1912: "Very many thanks for all the trouble you have taken with regard to the 'parasite.' I was of course surprised to hear of your diagnosis, but the examination you made puts it beyond dispute. I only regret the 'worm' did not reach you in better condition. I have shown your letter to two other veterinary surgeons who found it difficult to believe it was other than an ascaris."

As I have recently been asked by F. H. to publish the notes on the case, I submitted my sections and material to Professor E. E. Glynn, and he has very kindly taken the accompanying photographs, and added the following remarks:—

"Several macroscopic sections were cut through the material and these had all the typical appearances of an ordinary red blood clot laminated at the periphery. On microscopic section of the central portion it was seen to consist mainly of red blood corpuscles with a little fibrin and a few blood platelets. Here and there were very small quantities of pigment, evidently hæmosiderin. The periphery consisted almost entirely of blood platelets and fibrin, with some leucocytes and red blood corpuscles. The clot was evidently of recent origin, the central portion being the older. It had increased in size by the deposition of fibrin and blood platelets on the periphery.

Its appearance was quite consistent with that of a blood clot which had been formed in the ureter. There was no trace of parasites or bacteria."

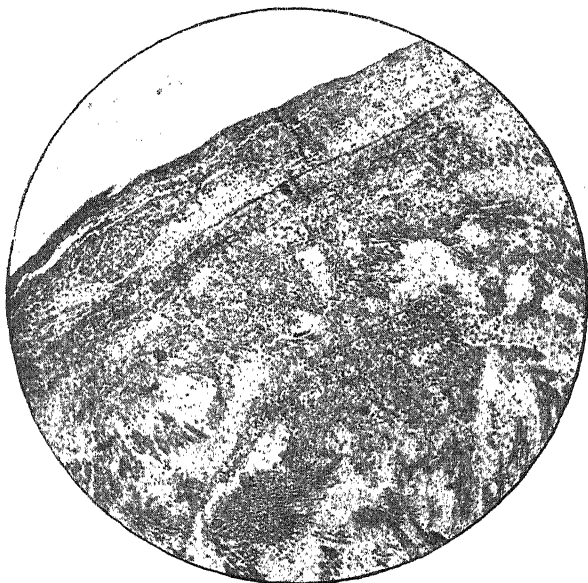


FIG. 2.—Peripheral portion of clot showing masses of blood platelets and fibrin with some leucocytes and red blood corpuscles. $\times 100$.

The clinical record and the microscopic structure of this thrombus appear to me worthy of record, inasmuch as at least four veterinary surgeons mistook it for a worm. One even asserted that it was alive.

AN INTERESTING CESAREAN SECTION IN A MARE.

By M.R.C.V.S.

IN May I was called in to attend a hackney mare, about 11 years old, suffering from tetanus, and found her very severely affected. I injected anti-tetanin without effect; in fact, she steadily became worse, and as she was within a week of parturition, and the foal was of valuable pedigree, I was requested to try to save it at the sacrifice of the dam.

Chloroform was accordingly administered, and the foal was extracted through an incision in the middle of the abdomen, the mare being afterwards chloroformed to death.

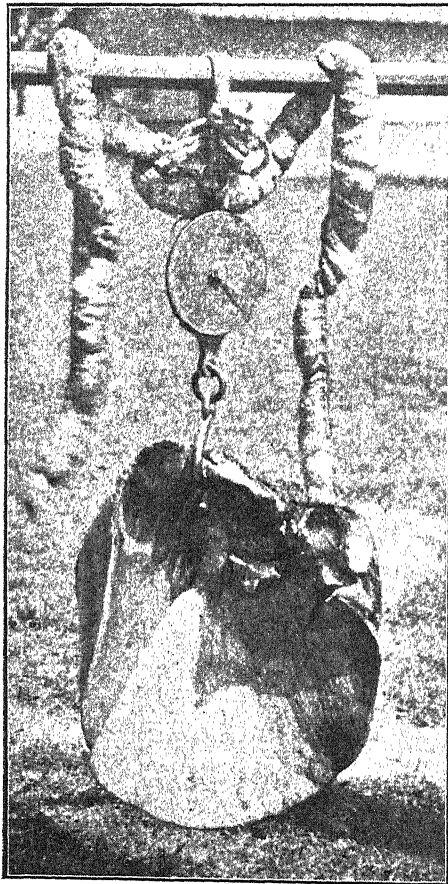
The foal was brought up in the usual way with cow's milk and lived for a fortnight, succumbing to an ailment which had nothing whatever to do with the way in which it had been brought into the world.

AN ENORMOUS LIVER IN A HORSE.

By CAPTAIN A. J. WILLIAMS, F.R.C.V.S.

Army Veterinary Corps, Ambala, India.

THE photograph is that of an enormous liver discovered on *post-mortem* examination of a country-bred gelding, 7 years old, which was drafted into the Service in March, 1910, but had never done anything



Photograph of the enlarged liver described in the text.

beyond training. The animal never carried condition, and was "pot bellied" and much sunken over the loins. Distinct enlargement of the liver could be felt externally during the later stages.

The horse was treated for anæmia and debility for 263 days out of two years; and eventually, as no improvement ensued, it was destroyed.

The *post-mortem* examination showed a condition simulating generalized tuberculosis affecting the lungs, liver, kidneys, intestines, and the surface of the bladder and pancreas. The liver weighed 90 lb., and was cirrhotic and calcareous throughout. I have once before seen a similar condition in a mule, the liver on *post-mortem* examination having the same appearance and weighing 30 lb. In this case there were no symptoms other than great and chronic debility with pendulous abdomen and sinking over the loins. The mule had the appearance of a mare in foal, the abdomen being so very pendulous.

The liver shown here in the photograph is enormous in size, and on that account is particularly worth placing on record.

SOME CASES OF FRACTURE FOLLOWED BY CURE.

By TATIN.

Losses through fractures in the French Army amount to 75 per cent. Without wishing to criticize this percentage, the author nevertheless thinks that sometimes a hasty decision as to slaughter is given when the subject of the accident might have recovered by reasonable treatment.

Indeed, cure might have perhaps been obtained without treatment and without dressing by setting the damaged animals at liberty, and, above all, without slinging them. If the subject is a mare one ought not to despair, even although a complete cure is not to be expected; more so than ever where by reason of a breeding crisis it is of value to preserve a mare which, although lame, may be used as a brood mare. In support of his argument the author quotes the three following cases:—

(1) A remount mare returning from the place of purchase whilst being embarked at night fell on the edge of the quay and fractured her pelvis; the fracture, complete, and splintered, was situated behind the cotyloid cavity and involved the ischium and

pubis at the level of the obturator foramen. The injured animal, after having covered four kilometres to reach the infirmary of the dépôt, was simply put at liberty in a box first of all and then turned out into a paddock. At the end of nine months it was no longer lame and rectal exploration showed consolidation of the fracture; only a complete depression of the croup remained. The mare was delivered up to its regiment two years ago and has not had a day's illness since the accident.

(2) A southern horse, very restive, was taken to the forge the day after purchase and fought so much against the man holding up the near fore-foot that he let go of it and the foot came down violently with the toe on the edge of the pincers. The horse stood on three legs and showed all the signs of fracture of the third phalanx. Poultices were applied for eight days. At the end of this time the injured animal was put in a paddock. Two months after it only showed slight limping when trotted on the pavement. The horse was then discharged to a remount dépôt, where it died of glanders four months later. Autopsy showed that there had been complete fracture of the third phalanx and subsequent consolidation.

(3) A Madagascar brood mare put her foot into a hole when galloping on the grass and fractured her pastern. The author did not apply any plastic bandages or silicate. A compression wadding bandage was alone used. The subject was eight months gone in foal and was put at liberty in a box until the birth of the foal. At this time the pastern was ankylosed by an enormous callus and the mare was led about the pasture. Two months afterwards, that is to say, five months after the accident, she followed the other in-foal mares and has continued her career as a reproducer.—*Revue vétérinaire militaire*.

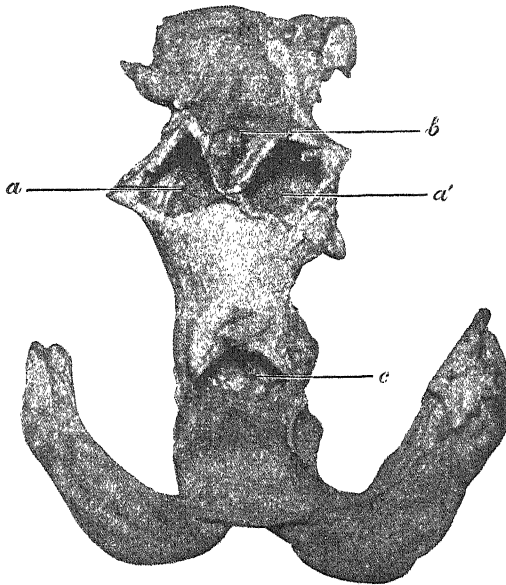
DOUBLE VAGINA AND CERVIX IN THE MARE.

BY PROFESSOR KELLER.

THIS is a case of abnormal development of the genitals in a mare which seems worth recording. The abnormality was discovered indirectly by reason of the death of the mare from volvulus.

The entrance to the vagina showed nothing abnormal. At the exit of the ureters the vaginal cavity was divided into two parts by

a folding of the mucous membrane, and each of these so formed recesses possessed a well developed portio vaginalis and a cervical



a, right os uteri ; *a'*, left os uteri ; *b*, division between vaginal cavities ;
c, simple body of uterus.

canal penetrable by the finger. Both canals led into a common but broadened body of the uretus.

STRICTURE OF THE INTESTINE.

By G. S. THOMAS, M.R.C.V.S.

Chichester.

ON the evening of July 10, 1913, I was called by a coal merchant to a six-year-old cart-horse. I happened to know the animal and his history is: A pedigree Shire horse, bred in the district and kept by breeder as a stallion, but getting no stock, was castrated and put to work. He was then sold to the coal merchant when old enough for road work.

On my seeing him on July 10 I found him suffering from abdominal pain of a very intermittent kind, and formed the opinion after watching him for some time that there was some obstruction. Exploration of rectum discovered a stricture about eighteen inches up, and I concluded that, as in former cases,

there was present corresponding stricture in the small intestine. As there is always a possibility of a mistake, although I was convinced as to the condition, I determined once more to try to get evacuation by means of arecoline hydrobromide. This completely failed in its object, but increased pain and salivated the animal. I have now quite discontinued its use as I have never seen good results follow its administration.

With the exception of a small bran mash and a small quantity of clover the animal ate nothing from July 10 to 21. Injections of milk and eggs have continued almost throughout this period, and as recovery seemed out of the question, I advised the owner to have the animal slaughtered. He consented, and I shot the patient on July 21.

Post-mortem revealed an interesting condition, as, with the exception of small pouches about four inches long, the whole of the small intestine had constricted and the pelvic flexure of the colon was attached to the back by a growth as large as a man's head. A portion was sent to the London Veterinary College and reported to be a sarcoma. What strikes me as being remarkable is that after eleven days the horse walked quite strongly and did not roll in his gait.

TWO MORE CASES OF OVARIO-HYSTERECTOMY IN SOWS.

By ASHLEY YOUNG, M.R.C.V.S.

Dunmow.

SINCE recording, a short time ago, in THE VETERINARY JOURNAL some observations on ovario-hysterectomy in the sow, I have had two more cases, each of which gave a successful sequel; and as in both instances the uterus was already septic, I think they are worth placing on record. Both were cases of dystocia, and in each case the animal was a young sow.

I operated in the same manner which I have already described in a recent number of the JOURNAL, and before amputating the womb I pushed a pad of cotton wool saturated with tincture of iodine around the site of incision and afterwards over the severed stump. Although the cases did not recover so quickly as those I wrote about before, the sequel was eventually quite satisfactory in each.

Canine Clinical.

OMENTAL HERNIA OF THE LEFT FLANK IN A DOG.

By J. F. D. TUTT, M.R.C.V.S.

Winchester.

It is owing to the comparative rarity of *true* flank hernia in the dog that I think the following note on a case that recently came into the infirmary may be of interest to readers of this Journal.

The subject was an Aberdeen terrier and a swelling that was situated high up in the left flank had been noticed for some time. It had previously been diagnosed by a medical adviser as a serous abscess. On manipulation the swelling was fairly hard and no opening into the abdominal cavity which would have led one to diagnose it as being hernia could be detected. The owner wished the swelling to be got rid of, and with her consent an operation was performed the following day.

The animal having been anæsthetized an incision was made, with the usual antiseptic precautions, directly over the swelling. A quantity (wineglassful) of urinous coloured fluid escaped, and on separating the edges of the wound it was seen that the "swelling" was due to omentum which was adherent to a small opening in the flank wall. The adhesions were carefully broken down and the omentum returned, the opening being sutured. The wound in the skin was sutured in the usual way. The animal made an uneventful recovery and was discharged shortly afterwards.

DR. MEADE BOLTON has accepted an offer from the Agricultural Department of Cuba to conduct a campaign against hog cholera, which is causing very great losses in the island. Dr. Bolton sailed from New York for Cuba on August 29, 1914.

Abstracts.

MODERN ASEPSIS AND ANTISEPSIS.

BY PROFESSOR SCHWENDIMANN.

Berne (Switzerland).

(Abstract.)

AFTER commenting on the difficulty of securing asepsis and antiseptis in veterinary patients, Professor Schwendimann writes: In the pre-antiseptic period the rule seems to have been that every wound should be kept as dry as possible. And this rule is a good one to-day because we know that moisture and warmth furnish the best conditions for the growth of bacteria, and that sparse wound secretion checks their development; we also know that the body itself furnishes protective cells which are far superior in their action to our wound remedies, and yet the material which these cells supply often suffers more from the effects of our antiseptic than the pathogenic bacteria themselves. The effect of antiseptics in solution is quite commonly over-valued. It has been proved that the bactericidal effect of sublimate solution suffers considerably in the presence of albumen solutions, and these are present in every wound. Finally, after all our trouble in rendering wounds germ-free, contamination occurs a few hours afterwards and pus organisms develop which become deep-seated in the tissue and cells and are no longer accessible.

For this reason we have turned to other handy ways of sterilizing a wound or the field of operation, and painting with tincture of iodine, as recommended by Grossich, has become a recognized procedure. In some cases a benzine swab is used before applying the tincture of iodine. The effect of this procedure is that the alcohol contents of the tincture produces coagulation of the protoplasm of the bacteria and these become fixed and later on killed by the specific effect of the iodine. I have used this iodine painting with good effect in the castration of stallions and cryptorchids and in the operative treatment of hernias and no complications have arisen afterwards. In recent times a new agent has come to hand, the chief effect of which is to fix bacteria. It is called mastisol.

According to Max Meyer (Berlin Dissertation, 1913) mastisol is chiefly a solution of mastix resin in benzol and certain silicates, and the preparation has been patented by the Brothers Schubert, chemical manufacturers in Berlin. Mastix itself is the resin of

Pistacia lentiscus, a Mediterranean sea plant. It is soluble in alcohol, ether, benzol, chloroform, carbon, disulphide and ethereal oils.

Heusner was the first to use this form of resin in surgery. His rather complicated solution was simplified later on by v. Oettingen. According to v. Oettingen, the effect of mastisol is to arrest and kill bacteria, check their development, and prevent clumping.

Collodion, gaudanin, chirol and dermagum are all impermeable, and in transpiration of the body the thin layer is lifted from the underlying parts by collection of moisture and favourable conditions arise for the development of bacteria.

Mastisol, on the contrary, is permeable, on which account the secretions can pass through the layer without influencing the bacteria arrested beneath it and in it. Evaporation goes on freely from the wound and the highly important principle of dryness of the wound is maintained. As the layer of mastisol takes up no water, and this latter is an important point in the development of bacteria, further growth is impossible. By the antiseptic properties inherent in all resins a great part of the bacteria is killed, and as a result of the great adhesive strength of the mastisol the dressing does not undergo the slightest stretching.

Mastisol may be used in wound treatment, sterilization of the field of operation and in bandaging technique. As a support to wounds it has been used in eye injuries, extirpation of capped elbows, and incision of capped hocks. Bursæ, tendon sheaths and joints may now be treated surgically with far greater confidence than formerly.—*Schweizer Archiv für Tierheilkunde*. G. M.

ECZEMA OF THE DOG.

By ESPOUY.

THE author holds the view that eczema of the dog in the greater number of cases is a manifestation of a special constitutional condition due to corpulency or an irrational method of feeding, or through want of exercise favouring lymphatic or arthritic diathesis. Just these internal causes make the treatment of eczema so difficult and uncertain. After enumerating and discussing the symptoms and lesions of the disease the author dilates on the drugs used in the external treatment of the disease. These include zinc oxide, bismuth,

resorcin, salicylic acid, silver nitrate, sublimate, creolin tar ointments, &c. Writing in the light of more recent investigations on the pathology of eczema of the dog, he ascribes the chief effect of internal treatment as due to the modifying of the general state of health of dogs affected with the disease. Of the drugs used some regulate intestinal activity, and secure antisepsis of the digestive tube. Such are sodium bicarbonate, sublimed sulphur, yeast and ferments (lactobazillin). Others have a complicated effect and are at the same time general tonic and nutritive agents and blood purifiers. Such are arsenical preparations, arsenious acid, Fowler's solution, arrhenal, bourboul water, as well as the recent arsenical compounds, salvarsan, arsenobenzol, &c., which up to now have only been used rarely in eczema of the dog. Other recent drugs have been used, chief among which is colloidal metal, which some authors contend has a bactericide effect as well as a supporting action to the defensive forces of the system. Thus collargol and electrargol have been used. The author has tried both agents and has had most success with electrargol injected intramuscularly in doses of 5 c.cm. to a medium-sized dog. He repeats the injection at varied intervals and has had excellent results in old-standing cases of eczema that have hitherto defied all other methods of treatment.—*Le Progrès agricole.*

Reviews.

Poultry Diseases and their Treatment. By B. F. Kaupp, M.Sc., D.V.S. Edited by D. M. Campbell, D.V.S. Pp. 181, with 56 figs. in the text. 1914. Price 5s. net. London: Baillière, Tindall and Cox.

At last we have a book on poultry ailments written by a veterinary surgeon in the English language with many Americanisms. Several works have appeared in print, produced and edited by laymen, and it has been somewhat of a reproach to the veterinary profession in this country that hitherto none of its members appear to have considered it worth their while to write a book on the common ailments of the useful domestic fowl. The knowledge imparted at the colleges has been chiefly limited to a study of the skeleton of the fowl for the first examination of the course and thereafter to forget all about the bird in the higher flights of equine, bovine and canine medicine.

The subject matter of the work under review is comprehensive and the information given up to date. The book cannot fail to be both useful and instructive to the veterinary surgeon who deigns to look at little things and does not consider a good knowledge of poultry and their diseases as beneath him.

Inasmuch as "prevention is better than cure," the importance of the section on "Sanitation," by Dr. D. M. Campbell, editor of the *American Journal of Veterinary Medicine*, will be duly noted, especially by those who know how often fowls suffer from bad hygiene and overcrowding. The few lines on the disposal of dead and sick birds are quite welcome and opportune.

The diseases proper include the consideration of external and internal parasites, diseases of the digestive tract, the blood, constitutional diseases, diseases of the liver, ovary and oviduct, respiratory passages, legs and feet, brain, tumours, bacteria of the intestinal tract of chickens, and the egg. Then follow chapters on isolation of non-layers, malformations, fractures, wounds and anæsthesia. The white diarrhœa of fowls, black-head, and ringworm of fowls, are well discussed. In connection with the first-named ailment in its coccidian form we always thought that the disease was spread by the organisms multiplying in remnants of food left about in summer time and taken up accidentally by the birds, and the treatment by sulpho-carbolates, estimated to save 80 per cent. of a hatch, would seem to indicate that this view is about correct. The article on black-head is the fullest and best we have yet read. With regard to ringworm we do not think it is right to ascribe the malady in fowls to the *Achorion Schönleinii* and consider it has been determined that the disease is a form of circinate ringworm (due to *lophophytum gallinarum*) rather than of honeycomb ringworm.

The treatments given in the book should be of great value to poultry keepers and are all simple of performance or easy of application and have proved effectual in many cases.

We wish that some more careful reading and proof-reading had been carried out in connection with the little volume.

On page 15 we notice "beak" spelt "beek" and "gullet" spelt "gullett," and all through the book there are evidences of haste or carelessness in production, e.g., "appearance" spelt "appearanc," "jumping off of" for "jumping off," "occasionally" transformed into "occassionally" and "this condition is race" for "rare." We are inclined to think that "*asthen*" for "*asthenia*" is a pure Americanism, but we do not know.

We welcome the book as filling a marked gap in English veterinary literature and wish it all success.

G. M.

Investigation into Scrapie. By J. P. M'Gowan, M.A., M.D., B.Sc., M.R.C.P.E. With an appendix in a case of John's disease in the sheep. William Blackwood and Sons, Edinburgh, 1914.

This book comprises twelve chapters of 111 pages on scrapie in sheep. Dr. M'Gowan has been carrying on his researches into this disease for a period of two years. The history of the malady as it occurs in Britain is discussed in the first chapter of the book. In the second chapter the disease as it is said to occur in other countries is summarized, then the symptoms and pathology of the complaint are given, and a case of the affection as seen in Germany has a chapter to itself. The remaining chapters discuss the various stages of sarcosporidiosis, which briefly is the factor which Dr. M'Gowan considers to be the cause of scrapie.

There are twenty-five illustrations as plates, some of them being representations of scrapie sheep and others showing various stages of the sarcocyst.

Dr. M'Gowan's researches seem to have been exhaustive and praiseworthy and his conclusions may be summarized as follows :

- (1) The sarcocyst is always present in the skeletal muscles of scrapie sheep in large numbers, and the more advanced the case the larger is the number of the sarcocyst present.

- (2) Pruritus (or itching), the chief symptom in scrapie, can be reproduced in rabbits by the injection into them of sarcosporidial emulsions.

- (3) Careful clinical examination of typical cases makes it highly probable that the parietic phenomena of the disease are due to a primary muscle lesion.

- (4) There is an absence of any condition *post mortem*, except sarcosporidiosis, sufficient to or of a nature likely to cause the phenomena observed in the disease.

- (5) No single view can explain so well the symptoms and general features of the disease as this. In dealing with the disease Dr. M'Gowan recommends sending affected animals to the butcher at once and in the early stage of the disease entirely changing the stock by bringing in fresh young ewes and getting rid of the old

ones ; where a complete change of stock is not made, breeding stock should be kept up from the progeny of the older ewes ; a diseased animal should not be used for breeding and inbreeding should be avoided.

Two farms during the investigations furnished cases of Johnie's disease in sheep and Dr. M'Gowan considers that many of the so-called " piners " of the Border district are really sheep affected with Johnie's disease. Acid-fast bacilli were found microscopically and great thickening of the small intestine macroscopically.

Having written so much with regard to the book and advising all those interested in scrapie and research to get it, we desire to make the following criticism : We do not think that Dr. M'Gowan has proved that scrapie in sheep is an identical disease with " Traberkrankheit " (the trotting disease). Most previous writers, and with good reason we think, have assumed that " trotting disease " and " trembling " correspond to the disease known in this country as " louping ill." From a consideration of clinical symptoms we have believed that " trembling " and " louping ill " were one and the same disease. If " trembling," " trotting disease," and " scrapie " are identical, the puzzle arises—what is " louping ill " ? Surely scrapie, louping ill, trotting disease, and trembling are not common names for one and the same malady.

The moral of the book, if moral there be, is to show plainly the necessity for further research into sheep diseases and the crying need there is for adequate financial support for veterinary research. We seem until recently to have known little about scrapie, our knowledge of braxy may be described as primitive, and louping ill apparently also lies in the region of obscurity.

These are only samples of many animal complaints which scientifically appear to be in the Noah's Ark stage ; this is not a credit to a civilized country that ought to be in the van of progress as regards animal diseases.

G. M.

The Milk Question in Edinburgh. By A. Philp Mitchell, Ch.M., M.D., F.R.C.S., formerly M'Cunn Scholar in Surgery and British Medical Research Scholar. Reprinted from the *Edinburgh Medical Journal*, April, 1914.

This is a pamphlet of twelve pages dealing with the milk of Edinburgh. The expenses of the very praiseworthy research of Dr. Mitchell were in part defrayed by the Carnegie Trust. We can only express our admiration for the clear way the investigator puts his facts before his readers and for the eminently common-sense conclusions he comes to. The doctor calls attention to the fact that about 10,000 gallons of country milk come into the city per diem, and yet there is practically no veterinary inspection whatever of country byres. The one veterinary inspector for the city, too, cannot possibly carry out adequate supervision of fully 2,000 cows. The " fresh country milk " is, according to Dr. Mitchell, more of a

myth than the fresh town milk that comes under the purview of the municipal veterinary surgeon.

Samples of milk were collected from the 201 milk shops in the seven wards of the city, and the investigation was chiefly to ascertain the presence of tubercle bacilli. Incidentally it was shown during the examinations that streptococci were very prevalent in ordinary samples of mixed milk, and it should be borne in mind that occasionally these organisms are highly virulent and responsible for cases of acute gastro-enteritis and epidemics of sore throat. The chief point, however, was that in films from only three samples of milk were tubercle bacilli detected, and this, according to the doctor, strongly supports the view that microscopic examination of the sediments from mixed milks is not a reliable method of determining the prevalence of tubercle bacilli. On the other hand, 41 of the 201 samples were found to contain tubercle bacilli when inoculation tests were conducted on guinea-pigs.

The result of the investigations shows that there is a considerable prevalence of udder tuberculosis among cows in country byres whose milk is sent to Edinburgh, for all milk from country byres reaches the consumers through the milk shops, which number fully 400 in Edinburgh. The high incidence of bovine tuberculosis amongst infants and young children residing in Edinburgh and district is thus explainable. As conclusions the doctor points out :—

(1) There is practically no veterinary supervision of two-thirds of the total amount of milk consumed daily in the city.

(2) Steps should be taken to establish a sufficient staff of veterinary inspectors.

(3) Clinical examination alone cannot be relied on for the detection of udder tuberculosis.

(4) Inoculation of the milk into experimental animals is the most certain method for determining the presence of the bacilli.

(5) Legislation as regards the milk supply should include provisions for enforcing the regular bacteriological examination of milk samples.

(6) Any measures to be effective must be so framed that they will be uniformly compulsory throughout the United Kingdom.

G. M.

Clinical Examination of the Blood and its Technique. A Manual for Students and Practitioners. By Professor A. Pappenheim, Berlin. Translated and adapted from the German by R. Donaldson, M.A., M.B., &c., Pathologist Royal Berks Hospital, Reading. Printed and published by John Wright and Sons, Ltd., Bristol. Price 3s. 6d. net.

This is a handy little book of 83 pp., and its contents is divided into three chapters comprising the Blood Film, Hæmocytometry, or the Enumeration of the Blood Corpuscles, and Hæmoglobinometry, or the Estimation of Hæmoglobin. The translator rightly writes that "the clinical examination of the blood

should be carried out as a routine much more frequently than is generally the case in practice" and in this book, of the cardinal lines of blood investigation Professor Pappenheim has only described those methods which have been definitely proved of value. The pathological conditions of the blood discussed relate mostly to human complaints such as anemia, leukemia, &c., but the work with regard to the technique of blood examination can be profitably studied by veterinary students and practitioners. The small book first appeared as a chapter in Carl Neuberg's "Handbuch der Ausscheidungen und Körperflüssigkeiten," published by Julius Springer in 1911. The chapter has been published in book form in answer to numerous requests.

G. M.

Trade Note.

WYLEYS LIMITED, COVENTRY.

Veterinary Specialities.—Anasthene: A local anæsthetic for injection in minor operations on horses, cattle, dogs, &c. Antiseptic Dusting Powder (white or pink): A faintly perfumed dusting powder, formed of pure starch and rendered antiseptic and healing by means of the addition of boric acid and oleate of zinc. In special dredgers holding 2 oz. and 4 oz. Antiseptic Rubber Bandages, waterproof, black or brown, 4 yd. long, 3 in. wide. Red Blister: An efficient combination of biniodide of mercury and cantharides. Green Blister (non-irritant): This blister is now in constant use in several racing stables, and gives universal satisfaction. It is prepared solely by a special process from cantharides, and contains no other active ingredient. Charges put up in rolls of $\frac{1}{2}$ lb. each, and prepared with a basis of gutta-percha, so as to obtain the maximum degree of rigidity and power to set quickly. Chlorodyne: This valuable preparation is too well known to need much description here. Its use is indicated in all cases of severe abdominal pain, in diarrhœa, dysentery, chronic cough, muscular rheumatism, &c., and in tetanus its use has been attended with considerable success. A similar preparation to the above can be had red, green, or colourless. Chlorodyne Miscible (red, green, or brown): This is an excellent preparation for disposing with gruel, water, or any aqueous mixture. Dog Shampoo: Prepared either with eucalyptus or creseptol. A liquid dog soap. Removes odour, destroys parasites. Dry Shampoo (for toy dogs): This is an excellent preparation for cleaning the coats of toy dogs. It also imparts a silky appearance and a delicate perfume to the hair. Glycerol Heroin (veterinary) (with licence of the owners of the word-mark): Each fluid dram contains $\frac{1}{16}$ gr. of heroin in combination with 3 gr. of hypophosphites of sodium and potassium, associated with 15 minims of tincture of hyoscyamus. This forms an immediate palliative and curative remedy if given for some little time. Glycerol Thymol Alkalina: Antiseptic and deodorant.

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THE VETERINARY JOURNAL

OCTOBER, 1914.

Editorials.

THE IMPORTANCE OF THOROUGHNESS IN DISINFECTION AFTER SWINE FEVER.

AN article written by a contributor to this month's VETERINARY JOURNAL adds a further tribute to the necessity for *complete* and *thorough* disinfection in attempting to stamp out any contagious disease. The particular one referred to in this instance was swine fever, and, as it is not exaggerating to assert that no more contagious disease than this exists, nor one which has given more trouble or anxiety to the officials of the Board of Agriculture, it is very interesting to read of an instance in which the source of infection was carefully traced to a cause which might easily have been overlooked. For further details we recommend our readers to read the article in question.

HORSES AND THE WAR.

THE supply of horses for the war has up to the present shown no shortage, and many good and fit animals have been taken away for their appointed work. The replacing of substitutes for these animals in the studs concerned has been pretty well accomplished in most cases, but it cannot be expected that with such a drain on present resources scarcity of material and high prices will not occur and be maintained for some time to come. The contemplation of the amount of horse flesh necessary for home defence has led many expert men to call attention to our inadequate supply here, and if normally the supply is too small for home defence, what can be said of it when the

requirements of an expeditionary force operating in a country near at hand have also to be taken into consideration?

In the piping times of peace there is a tendency for Governments to deal primarily with pressing social matters affecting large masses of people and to give paramount attention to them, whilst minor matters, almost as important to the life of a nation but not so pressing, and touching a lesser circle of humanity, get neglected or put aside.

For many years the horse-breeding industry in this country has been unable to come into its own, operations have been conducted in a haphazard fashion with inadequate financial support by the State, and yet "the derivation of chivalry is not an historical fact to be burked." Fortunately we have in France an ally in this war which has spent as much as £300,000 in one year on horse breeding. Incidentally we may also mention here that the United States has spent an average of £60,000 a year on the improvement of cavalry horses. This makes the sum of £4,000 spent by us (until recently) on similar operations seem paltry indeed, and yet there is great need for an adequate supply of light horses to be kept up here.

In 1831 we exported 718 horses from our shores, and in 1908 we sent away 53,000. We have a wastage of about 4,000 army horses annually in times of peace. What will be our losses through this war, and what steps will be taken by the State to deal with the loss? That the scarcity will be great nobody can deny, and the question when the war is over will be how the supply can again be brought to normal and afterwards increased, and how something really effective can be done for horse breeding.

Let us hope that some influential man, a veritable giant in horse matters, will arise, who will be patriotic, persistent and knowledgeable enough to keep pegging away in Parliament on the subject until a well-thought-out plan and scheme have been evolved, carried through, and continued with adequate public and Government support.

HIS MAJESTY THE KING has been graciously pleased to accept and acknowledge a copy of the International Congress (August) Number of THE VETERINARY JOURNAL.

General Articles.

SOME FURTHER EXPERIMENTS IN THE PREVENTION OF BOVINE EPIZOOTIC ABORTION.

By J. BASIL BUXTON, F.R.C.V.S., D.V.H.

Wellcome Physiological Research Laboratories, S.E.

FOLLOWING some laboratory experiments carried out with a view to preventing contagious abortion of cows, and a short series of field experiments, I read a brief paper before the Eastern Counties' Veterinary Society at Colchester. The results of these experiments were recorded, and it was pointed out that on account of their small number and the meagre data then available no definite conclusions should be drawn from the results. At the same time I appealed to the members present to afford me by their co-operation an opportunity of further investigating the prophylactic properties of a vaccine, the details of which were given. As a result of that appeal several practitioners volunteered to provide the clinical material and to test the properties of this vaccine. The preliminary report briefly outlined the results of the following experiments carried out with rabbits, goats, and cows.

RABBIT EXPERIMENTS.

Twenty-four full-grown, non-pregnant female rabbits received weekly injections of a saline suspension of *Bacillus abortus*, which had been killed by heating for one hour at 60° C. Three injections were given, the dose being 5, 10, and 25 thousand million organisms. From three to four weeks after the last injection the animals were served, and all were infected by means of a saline suspension of living organisms which had been grown for twenty-four hours on surface glycerine agar. All were infected forty-eight hours after coitus. Of the twenty-four animals six were infected by the intravenous injection of 0.5 c.c. of a rich suspension of living organisms and all aborted during the third week of pregnancy.

Nine were infected by the administration of 2 c.c. of the same suspension *per os* and all went full time and produced normal young, while of three normal control rabbits two aborted and one produced normal young. Nine protected rabbits were infected *per vaginam*, and of these eight produced normal young

while one aborted. Three normal control rabbits infected in a similar way all aborted.

Twenty adult non-pregnant female rabbits were infected twenty-four hours after coitus, ten *per os* and ten *per vaginam*. Eight from each of these two groups received subcutaneous injections of killed *B. abortus* in similar doses to the twenty-four rabbits originally protected. Four rabbits, two from each group, were kept as controls.

Of the eight rabbits infected *per os* all produced normal young, while of those infected *per vaginam* five produced normal young and three aborted.

Of the four control rabbits two were infected *per os* and two *per vaginam*. One of the two infected *per os* aborted and one produced normal young, while the two infected *per vaginam* aborted. The results obtained from these rabbit experiments were obviously not entirely a success, for, of the rabbits protected and subsequently infected *per vaginam*, while eight produced normal young one aborted; and of the three control rabbits infected *per os*, one produced normal young while two aborted. Of the twenty infected immediately after coitus and subsequently protected, while the eight infected *per os* all produced normal young, three of the eight infected *per vaginam* aborted. It would appear, therefore, that infection *per os* in the rabbit, even when a strain of the organism pathogenic for that animal is employed, is not entirely satisfactory. Intravenous infection, in spite of previous attempts at protection, produced abortion in every case.

These results were, however, sufficiently interesting to justify a continuation of the experiments with other animals.

GOAT EXPERIMENTS.

Goat 1.—One adult non-pregnant female goat received three subcutaneous injections of a saline suspension of killed *B. abortus* in doses of 50, 100, and 200 thousand million organisms at intervals of seven days. Seven weeks later she was served, and two months after coitus was infected *per vaginam*. She went full time and produced one normal young. The complement-fixation titre, which previous to the immunization equalled 0, was found to rise steadily during the injections, and to have reached the maximum one month after the last injection, then being equal to 0.0025. It then fell gradually and immediately before the animal

was infected was equal to 0.005. Four days after the injection of living material into the vagina it equalled 0.0001. Three weeks after the birth of the kid the complement-binding titre had again fallen to 0.005 and the agglutinating titre was 1 in 1,000.

Goat 2.—An adult female was protected in a similar manner. Two months after coitus she was infected *per os*. She went full time and produced two fully developed young, which were breathing when delivered, but owing to the length of time which elapsed during parturition (this being the first time that the animal had been bred from, and the kids large in proportion to the mother) subsequently died. The complement-binding titre showed in this case also a somewhat similar curve.

After the injections the titre was found to have risen from 0 to 0.0025. Two months later it had fallen to 0.01, and seven days after infection *per os* rose to 0.0025. Two months after parturition it had fallen to 0.2.

Goat 3.—An adult female was protected in a similar way to goats 1 and 2. Two months after coitus she was infected by an intravenous injection of living organisms, and forty-eight hours later she aborted.

Goat 4.—An adult female was employed as a control. One month after coitus she was infected *per vaginam* and aborted six weeks later.

Although the animals used in these experiments were few in number the results were encouraging. While the animal which was protected and subsequently infected by the intravenous injection of living organisms aborted, those infected by large doses by the ordinary channels of entry of the organism resisted infection and the control animal aborted. Four different strains of *B. abortus* were used for protection, and a fifth and different strain for purposes of infection. In no case was it found possible to obtain cultures of the organism from the uterus of protected animals which had produced young; but since it was not possible to recover the organism in every case from animals which had aborted, one was not able to attach much significance to this fact.

COW EXPERIMENTS.

These experiments were carried out on farms on which contagious abortion was known to exist, and the veterinary surgeons in attendance were kind enough to inject the material with

which I supplied them for the protection of the animals, and subsequently to furnish me with reports. My thanks are due to Mr. Warren, F.R.C.V.S., of Hadlow, who has helped to furnish me with many important facts concerning these experiments.

Farm 1.—The serum of eleven cows was tested by both complement-fixation and agglutination methods, and four were found to react, the titres being 0·02 and 1/25, 0·05 and 1/1,000, 0·1 and 1/300, and 0·02 and 1/500. Each of the cows received three subcutaneous injections of a saline suspension of killed *B. abortus*, the doses being 75, 150, and 300 thousand million organisms. One reactor was later slaughtered as she was in good condition, and the other three calved normally. At that time five of the seven non-reactors had calved normally and the remaining two had not then gone full time. Since then Mr. Warren has informed me that the two remaining cows have calved normally. In this case, therefore, normal calves have been obtained from reactors which had aborted and others which had not, and also from animals which gave a negative reaction to the combined serum tests.

Farm 2.—There were on this farm thirteen cows in all, eight old cows and five recent purchases. All the old cows had been on the farm two years, and the owner stated that new cows invariably aborted. Of the eight old cows, four had aborted the previous calf. All the old cows and one new one showed complement-binding titres to *B. abortus*.

As in the case of Farm 1, all the cows were protected and received similar doses. At the time of making my first communication eleven cows had calved normally and two had not then gone full time. Since then all the cows have calved normally, it being the first time to the owner's knowledge that such had occurred.

Through the kindness of Mr. Arthur Holl, M.R.C.V.S., New Buckenham, I have been able to carry out further experiments by attempting the immunization of two herds. The clinical diagnosis of epizootic abortion was confirmed by a series of complement-fixation and agglutination tests carried out with the blood from several animals in each of the herds, the first of which consisted of forty-eight animals and the second of one hundred animals. So far time only permits of a definite result

being obtained from the protection of the first of these herds, of which Mr. Holl reports as follows:—

“A client, who owns a herd of forty-six cows and two bulls, had during the past two years greatly suffered from abortion in his cows. I was asked to go and look at these cows, and he showed me five cows which had recently aborted, one of these five having aborted three times in succession. I advised him to have the blood from these cows tested, to which he agreed. I sent the blood of these five cows to Mr. J. B. Buxton to be tested. I received a letter from him in the course of a day or two saying that the five samples of blood gave positive reactions to both agglutination and complement-fixation tests and showed very high titres in both. Mr. Buxton advised me to inject the herd with vaccine, which I did, and up to the present five cows have calved normally and not a single one has aborted. I have just started to protect another herd of cows, and shall be pleased to give the result later on. August 25, 1914.”

In these experiments a slight modification has been adopted in the method of immunization, the course being extended to five injections at intervals of one week, and increasing from a primary dose of 10 thousand million organisms in 10 c.c. to a final dose of 500 thousand million organisms in 25 c.c. of saline.

Similar experiments were carried out with a herd of seventy animals in conjunction with Mr. Ledger, M.R.C.V.S., of Redhill. Mr. Ledger reports that whereas, previous to the protection of the cows, the percentage of abortions had been very high and had entailed a serious loss to the owner, no abortions had occurred since the injection of the vaccine. More detailed results of experiments carried out with this and other herds will be furnished in a further communication at a later date. While the results obtained so far are eminently satisfactory, one must admit that the element of coincidence has not entirely been eliminated. It is, however, hardly to be expected that coincidence would account for the fact that on three farms controlled by three practitioners, the abortions should cease immediately after the course of immunization. The evidence would have been more conclusive had it been possible to have left some of the animals unprotected to act as controls, as in the case of the laboratory experiments, but owners are not anxious to risk the loss of

even one calf when there appears to be some hope of preventing it. The good results attending the experimental work may be ascribed partly to the fact that the disease is localized and of a subacute or chronic nature, thus rendering the effective elaboration of antibodies more marked than in conditions of a more acute nature, and also that very large doses of a polyvalent vaccine were employed. The dosage was based entirely upon experience gained in the immunization of other animals against various organisms for the production of specific anti-sera, and as a result of this and other experimental immunization one has been forced to the conclusion that in veterinary work, certainly, no definite dosage can be laid down for the effective elaboration of antibodies in more than one disease. Experience obtained from experimental work alone enables one to decide when and by what means the most efficient response on the part of the animal organisms can be induced, and it is only by obtaining the maximum efficiency that completely successful results can be produced. The enormous economical significance of a successful method of preventing contagious abortion among cows is obvious, and it is with a view to carrying out further research on the lines already adopted that I confidently make an appeal to members of the profession, in whose practices this disease occurs, to aid me by their co-operation in establishing the efficacy of this vaccine in the eradication of the complaint.

CONCLUSIONS.

From the foregoing experiments it would seem that there are reasonable grounds for assuming that it is possible to produce in susceptible animals a sufficiently high degree of immunity against *B. abortus* by means of suitable doses of a vaccine composed of killed organisms. The figures at present available are not sufficiently numerous to permit of a definite assertion being made. In view, however, of the many advantages which this method of protection possesses over that entailing the use of living organisms in which the element of risk of infection from the vaccine has to be taken into consideration,* further work in this direction is of the utmost importance.

A further communication supplying a more complete set of figures will be made at an early date.

* SURFACE, F. *American Veterinary Review*, September, 1913.

SACKS AS CARRIERS OF SWINE FEVER.

By J. F. D. TUTT, M.R.C.V.S.

Winchester.

WE are told by various authorities that this scourge of swine can be carried over the country by pig's feet, even though they are not affected; also by dealers, cattle trucks, fairs, markets, birds, and so on.

No reference is ever made to an agent that in all probability is much commoner, and one that, no doubt, accounts in no small measure for the unsatisfactory efforts of the authorities to stamp out the disease, not only in this country, but in others also.

The agents that are always overlooked, and which, I believe, are very active propagative agents, are the *sacks in which pollard and other fodder* is generally sent out.

In most cases, as soon as a pig is taken ill, a sack is almost invariably thrown over it, in the sty. Away goes the infected sack (on the demise of the pig) with others to the vendor, who refills them, and they are sent out to another client, amongst whose pigs the disease, which has hitherto been unknown, makes its appearance.

A striking example of this was recently related to the writer by an inspector who has had a life-long experience of the disease. In one district he could find no clue from whence the malady was coming. Cases of the disease were occurring with remarkable frequency in sties in a district which was previously quite healthy, and as soon as one case was dealt with another one cropped up. As none of the owners had intermingled with each other's stock, the problem of from whence the disease was coming was by no means an easy one to solve. On making inquiries he found that the different pig-owners had all obtained their pig food and other fodder from one particular merchant, and that no disease had occurred amongst their pigs until they had purchased the food from him. It was also of interest to note that those few pig-owners who had bought their pig food and other fodder from a different source had remained free of the disease.

The vendor of the "infected" sacks was approached, and for a consideration agreed to destroy all the sacks, which was

done in the presence of the inspector. The result was—no more swine fever.

In this case his sacks had obviously become contaminated on some previous occasion, in the manner alluded to at the beginning of this article.

The writer believes that the fact that sacks are fertile agents of propagation of the infection has long been recognized by the general practitioner, who has unfortunately only too small a share in the control of the disease, when practical knowledge, as in other things, is of more value than a whole volume of theory. No disease requires more drastic revising as regards administration and searching investigation than swine fever in this country.

Equine Clinicals.

PICKED-UP NAIL—SUPPURATING ARTHRITIS— CURE BY BIER'S METHOD.

By L. A. BICHOT.

Veterinary Surgeon attached to the Veterinary Infirmary of the 5th Hussars at Nancy.

THIS short note relates simply to the cure of an apparently hopeless case arising from a penetrating nail. The cure was due in a great part to the adoption of Bier's method.

On March 22, in the course of a visit I made to a friend near Nancy, where I was on military service, he showed me a colt that had been affected for six weeks with a penetrating wound under the foot caused by the tooth of an American forked nail. A probe introduced into the wound revealed a fistula between the wall and the third phalanx. Fear of injuring the synovial articulation hindered me from measuring the exact depth of the fistula. Some humid dressings, applied after thinning the horn, not having given any good results, operation was decided on. The caries of the os pedis was easily curetted, and stretching of the fistula enabled one to see a fleshy, greyish necrotic bud. With the aid of forceps it was raised and removed with curved scissors; but soon purulent synovia flowed away, which issued from the second phalangeal articulation. One could also see

quite plainly at the end of the tunnel so made the inferior iridescent extremity of the second phalanx.

Following out communications made by Army veterinary surgeons in particular, and calling to mind the lessons of my master, M. Coquot, on the excellence of Bier's method in such cases, I recommended an india-rubber bandage to be put on the middle of the cannon bone, and I put on also a compressive dressing made up with tincture of iodine and boric acid. I re-applied the dressing every eight days, and the india-rubber bandage was put on for an hour, morning and evening. On April 28 the colt was considered to be cured. During the whole time the animal was at liberty in a loose box with its mother; in spite of the fatigue of the ailing limb, both ankylosis and laminitis were avoided.—*Recueil de Médecine Vétérinaire*.

POISONING BY GLECHOMA (GROUND IVY) IN THE HORSE.

By J. FERENCZHAZSY.

Municipal Veterinary Surgeon at Kevchaza.

THE author has observed nine cases of intoxication due to ground ivy (*Glechoma hederacea*), and yet this labiate has occasioned no trouble in cattle and sheep that consumed it.

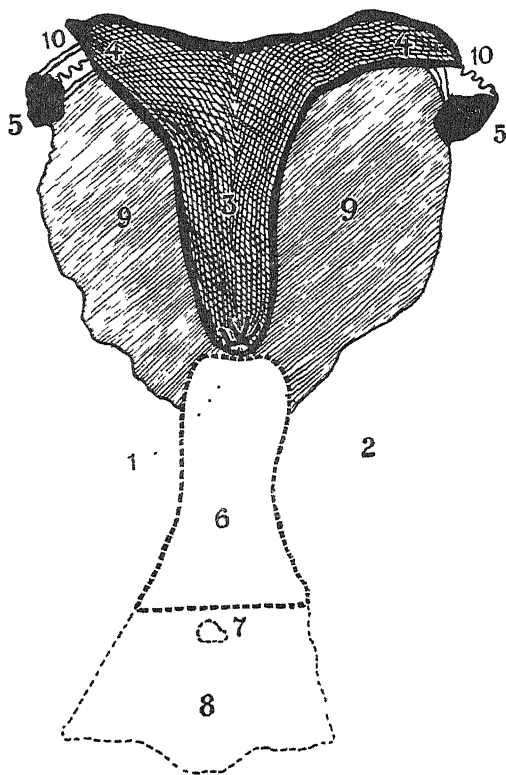
The symptoms observed in horses were as follows: Anxious look, dyspnœa, salivation, sweating, dilatation of the pupils, cyanosis, signs of pulmonary œdema. In the stable there was a strong narcotic odour emanating from dried lucerne mixed with numerous bluish labiate flowers and little dark green leaves of ground ivy; it was to the latter plant that the strong odour in question was attributable, and the ethereal oils therein had caused œdema of the lungs. The ailing subjects were taken out of the stable and bled; camphorated injections were then given to them and castor oil administered, and thereafter tannin in mucilaginous water. Six were cured and two died. At the autopsy there was pulmonary œdema and cerebral hyperæmia, but the digestive tube was intact. Similar cases were observed last year by other owners; through lack of treatment they terminated fatally.—*Recueil de Médecine Vétérinaire*.

AN UNUSUAL CAUSE OF STERILITY IN A MARE.

By J. F. D. TUTT, M.R.C.V.S.

Winchester, Veterinary Remount Office for the Borough

THE subject was a valuable thoroughbred mare recently sold to the present owner at a low sum, owing to the fact that she had not conceived in spite of repeated services. On examination *per vaginam*, no os uteri could be seen, although it could



1, occluding vaginal wall; 2, os uteri isolated by occluding anterior vaginal wall (1); 3, body of uterus; 4, uterine horns; 5, ovaries; 6, vagina; 7, meatus urinarius; 8, vulva; 9, broad ligament of uterus; 10, Fallopian tube.

be distinctly felt behind the anterior wall of the vagina. The vagina, as it were, formed a sac-like structure, no communication existing between it and the uterus (see diagram).

The anterior wall of the vagina (1 of diagram) could be pushed into the os by means of the finger tips; it was *not* a case of imperforate hymen, as would occur at first to the mind of the

reader. Treatment advised was operation, incising the occluding vaginal wall (1 of diagram), and so establishing communication between vagina and uterus.

The owner consented, as the mare's value would be considerably enhanced if she could be got in foal. Owing to the outbreak of the present war, and the conditions caused by same, this has not been done; but the writer hopes, at no distant date, to record the result of the operation, if same is then rendered possible.

Canine and Feline Clinicals.

BIER'S TREATMENT IN A BULL-DOG.

By G. MAYALL, M.R.C.V.S.

IN THE VETERINARY JOURNAL for May, 1914, Mr. Charles Hartley, jun., F.R.C.V.S., of Lincoln, published a very interesting paper on Bier's treatment in veterinary practice. On July 9, a bull-dog, "Prince," owned by the proprietor of a picture-house here, was brought to me with eczematous sores about his head and hind feet. On examining the hind legs I found bulgy swellings on the outside of the hock joints and just below them, and on squeezing these swellings they burst and discharged a dirty, dark-coloured, bloody fluid. I treated the dog from July 9 to August 4 with antiseptic baths, squeezing the sores under water in the bath and afterwards dressing the places with boracic ointment to which a few drops of pure carbolic acid were added. Internally the dog had pills of calomel and antim. tart. On August 1 he was so much better that he was returned home. On August 4 the owner brought him to me again, saying that his hocks were not quite right, and on examining him again I found that from small holes round about the tarsus there was still some bleeding, which increased when the joints and skin were pressed. The skin round the hocks and beneath them was also much thickened and devoid of hair.

From August 4 to August 13 I gave the dog a daily bath (up to above his hocks) in lysol solution and commenced putting on each hind leg above the hocks an india-rubber umbrella ring. These I left on for about two hours, morning and afternoon,

with a pretty long interval in between. After about three days of this treatment the discharge from the sores became less and the skin looked less inflamed and tumefied. Briefly, the india-rubber ring treatment and the lysol baths were continued for nine days, when the dog was discharged cured and he has been all right since. I have had several cases of these troublesome discharging swellings on dogs' limbs and shall certainly adopt Bier's treatment with any more that come to hand.

TETANUS IN A DOG.

By T. M. INGLIS, M.R.C.V.S.

Forfar.

A FOX-TERRIER, about 2 years old, was brought to me for examination, the owner, a medical man, recently resident in India, suspecting rabies. The case looked suspicious at first, but careful observation revealed clearly all the typical symptoms of tetanus. Retraction of the eyeball was well marked, the patient could be lifted about like a stuffed dog and remained quite rigid when put down. The jaws were never completely closed and the animal was able to take nourishment with assistance. Having made up my mind I had a case of tetanus to deal with, I gave an aperient and every second day a small dose of antitetanin until six doses had been given. I put the subject in a dark cage and watched developments. About the third or fourth day I observed an improvement in the way of lessened excitement when asked to move. The muscles became less tense and the animal was able to get his head down to his food. Improvement continued and all the bad symptoms gradually disappeared, although it was quite a fortnight before the eyes became normal. The animal had been ill about a week before being brought to me.

I found a small abrasion on one of the fore paws which might have been the seat of infection. I am not altogether satisfied that the antitetanin had a curative action, but I think it had some influence on the recovery of the case. I have had well-marked cases of tetanus in cows and bullocks but this is the first one I have had in the dog.

CÆSAREAN SECTION IN A CAT.

BY H. C. GANGULY.

House Surgeon, Canine Ward, Bengal Veterinary College, Calcutta.

THOUGH Cæsarean section may have a wider existence in the medical profession, it is not to be contemplated any the less important an operation in veterinary surgery. A fair number of such are frequently performed on canines, felines, and the larger obstetrical patients in this part of the country with varying success. And it cannot be denied that the aseptic treatment which has such an important bearing upon successful results in abdominal surgery speaks of a lasting memorial to the creative genius of Lister. Owing to the difficulty in obtaining perfect asepsis, more especially in the larger animals, necessary for the success of this operation, our attempts are frequently made futile by finding the foetus in a septic and mutilated condition, or by the later restlessness of the patient.

On June 26 last, a white Indian cat, in a somewhat fatigued state, belonging to a Bengalee gentleman, was admitted into this hospital for treatment of dystokia. The patient was reported to have been in labour pains for over twenty-four hours. On manual exploration *per vaginam* a highly decomposed right fore leg of the foetus, with the head twisted inside the womb, was being presented. Owing to the comparatively large size of the foetus and narrowness of the passage, which hardly permitted of a finger and forceps together to pass through, attempts at delivery by the usual means seemed to be quite impossible.

As the cat was a fairly well-nourished one and had been suffering persistently from intense pain, an operation was suggested as a last resort.

Modus Operandi.—The cat was placed on her back on the operation table, an area of about 5 in. by 3 in. on the abdomen was cleanly shaved and painted with tincture of iodine. Thus having prepared the operation field, the cat was put under deep anæsthesia with 3 dr. of freshly made A.C.E. mixture, a longitudinal incision of about $3\frac{1}{2}$ in. in the median line, exposed the subcutis and other underlying structures, the tunica abdominalis and rectus abdominis were quickly slit open, until the abdominal cavity was reached. Then with all possible aseptic precautions the parietal peritoneum was divided, and by setting aside the

mesentery and other viscera with the index finger, the left horn of the gravid uterus was brought into view.

Then by keeping open the cavity with two retractors held by an assistant from either side, the uterus was gently pulled out (with two fingers against the abdominal incisions), turning the patient, at the same time, a little to the left to prevent trickling of uterine fluid into the abdomen. Subsequently, by incising the visceral peritoneum, longitudinal and circular muscle fibres of the womb, and by letting out the putrid fluid therefrom, a decomposed foetus, with all its coverings, was removed.

The uterine cavity was then thoroughly cleansed and an ounce and a half of normal saline solution was poured in. The



edges of the uterine wound were sutured with catgut, the lips being inverted to allow of adhesion between the two in-contact peritoneal surfaces. The abdominal muscles were next sutured with catgut, and finally the skin by interrupted silk sutures. The wound and its surroundings were thoroughly sponged out with lysol solution, and later wiped and dried with boro-iodoform. Collodion was painted over the stitches and the part protected by antiseptic gauze under plenty of boric padding, and then bandaged with moderate pressure.

The operation was practically a bloodless one and needed no steps for arresting hæmorrhage. On the same evening the cat was given 8 minims each of chloric ether and sweet spirit of nitre to 2 drams water and a little warm milk.

Next morning the temperature was 103° F.: 4 oz. of physiological salt solution made from B. W. and Co.'s compound soloids, were injected subcutaneously on each side of the chest. The uterus was syringed out with a few ounces of (1-40) liquid extract hydrastis lotion. In the evening the temperature was 104.1° F. Anti-streptococcus serum 10 c.c. (Parke, Davis and Co.) was injected hypodermically, close to the seat of the operation, and a thick piece of flannel was wrapped all round her abdomen.

On the 28th temperature was found to be 105° F. The uterus was gently douched out with $\frac{1}{2}$ per cent. solution of lysol and the animal left alone in a cage. In the evening she was given aletris cordial Rio 5 minims and brandy 10 minims with a little water.

On the 29th, on account of the gradual rise of temperature, the operation wound was re-opened and it was found that the last three posterior skin sutures, after having worked loose, were suppurating. They were forthwith removed and after thorough cleansing the slightly dilated lips were not re-stitched but were allowed to unite by granulation. The rest of the incision had already united, yet the stitches were not removed until a few days later.

From the 30th the animal gradually commenced to improve and accepted food. During the first four days after operation the cat was totally off feed, rectal injections of 4 oz. of egg-flip with 10 minims of brandy, twice a day, being all she had as sustenance.

On the eighth day, bandages and other coverings were removed and a little boric powder was occasionally dusted on until July 12, when the animal was discharged, making a complete recovery within sixteen days.

Abstract.

ABSTRACT FROM THE REPORT OF MR. T. D. YOUNG,
M.R.C.V.S., ON HIS VISIT TO THE ARGENTINE
REPUBLIC IN CONNECTION WITH THE INSPEC-
TION OF MEAT IN THAT COUNTRY.

MEAT INSPECTOR'S OFFICE,
503-4, CENTRAL MARKETS,
SMITHFIELD, E.C.,

To the Worshipful the Sanitary Committee.

VISIT TO THE ARGENTINE REPUBLIC.

GENTLEMEN,—I herewith submit to you a Report and Appendices dealing with the methods adopted in preparing meat for human consumption, from the time the animals arrive at the Frigorificos until the meat and offal arrive in this country.

On arrival at Buenos Ayres, I was met by Dr. Suarez, representing the Argentine Minister of Agriculture, and the Secretary of the British Legation, representing Sir Reginald Tower. Both of these gentlemen were untiring in their efforts during the time I was in the Argentine Republic, and rendered your officer every assistance.

After being introduced to the Minister of Agriculture and the Officers of the Rural Society (equivalent to the Royal Agricultural Society of Great Britain), also the President and officials of the League Agrarian, all of whom are interested in the exportation of meat and the breeding of cattle, I commenced the work which I had been invited to perform, namely, to view the work of meat inspection as conducted at the Frigorificos in Buenos Ayres, Campana and Zarate.

IMPORTANCE OF THE ARGENTINE DEAD MEAT TRADE.

It is of interest to consider here the importance of the dead meat trade of the Argentine Republic and how necessary it is that the Corporation of the City of London should be satisfied that the meat arriving within its jurisdiction is prepared for human consumption under hygienic conditions, is carefully in-

spected as to freedom from disease, and is conveyed from the place of slaughter to the Central Markets, Smithfield, in a satisfactory manner.

The following figures show, not only the importance of the trade, but how much the Central Markets depend on supplies from South America:—

PERCENTAGES OF MEAT IMPORTED.					
Country		Beef		Mutton and Lamb	Pork
Argentine Republic	...	82'60	...	22'20	—
Australasia	...	17'30	...	72'43	—
Belgium...	...	—	...	—	1'75
Holland...	...	—	...	2'30	92'77
Other countries	...	0'09	...	3'07	3'06
U.S.A. ...	...	0'01	...	—	2'42

The weight of chilled beef from the Argentine Republic in 1913 exceeded the weight of that sent in 1912 by 66,822 tons or 34'4 per cent.

The exportation of cattle and sheep from the Argentine Republic into Great Britain began in 1889, and the trade increased very rapidly.

METHODS OF SLAUGHTER.

Handling of Carcases and Offal.—In order that the system of slaughter, &c., be understood, I think it best to follow the animal from the time it enters into possession of the Frigorifico owners until the meat, offal, &c., is ready for shipment.

Preparing Animals for Slaughter.—The animals are purchased in the markets or on estancias and thence conveyed by rail or steamer to the “corrales” or “camps.” Some Frigorificos have very large camps extending over 6,000 acres. There the animals rest and feed on grass for some time, depending on the demand of the British markets; from there they are brought to the “corrales,” where there is accommodation for 3,000 to 5,000 animals; here they are fed, watered and rested for forty-eight hours, and then watered only for twenty-four hours in what is called the “hungering place.”

Prior to slaughter they are removed in numbers and put under a spray bath for some time, where jets of water fall on and around them; this is said to cool and quieten the animals and also to loosen the dirt on the skin.

In one place they are put through a swimming bath: I was assured that this did good, and no doubt those responsible must

be qualified to judge the benefits derived, but other persons viewing the following procedure may have a different opinion. The method is as follows:—

The animals are driven up a few steps and then down a few steps into a bath through which they swim, but there is a considerable amount of struggling and crushing when two animals enter the passage which leads to the bath. The method of driving the animals on is by means of an electric pole which conveys a slight shock to the animals: this has been found a much more humane method than using sticks, &c.

One animal goes in front of the other, then into the bath, swims through the dirty water in which scores of its companions have previously gone, then struggles up a few slippery steps into what is called the “knocking box.”

How Animals are Killed.—The animals pass into two “knocking boxes,” the doors behind them are closed, thus they cannot move in any direction as the boxes are about the size of a large ox. A man standing on a platform nearly level with the back of the animal hits it on the front of the head, or if the head is turned down the blow is aimed at the back of the head. The hammer used is not like the pole-axe employed in this country, but has a flat face, somewhat like a blacksmith’s forge hammer, the reason being that a pole-axe would injure the brain, which has a commercial value. The animal falls from the effect of the blow, a lever is pressed, one side of the box rises as also the floor from one side, so that the animal is pitched out; it falls on to a floor where a boy stands ready with a chain, part of which he puts round the animal’s hind legs just above the hock joint, the other part he attaches to a hoist which quickly raises the dead animal to a sufficient height to allow the weight of the body to run it by gravitation by means of a hook and rollers to the place where the animals are bled.

How Animals are Bled.—In some of the places an electric travelling crane conveys the dead animals at the rate of one per minute to the place where the animals are bled. There a man stands with a large knife and opens the large blood-vessels at the entrance to the chest. After the blood has ceased to run out of the carcase, it is pushed along as described to the place where the “header” stands, who skins the head and disjoints it from the neck, but allows it to remain attached by means of the skin.

The carcass is now quickly removed to the dressing hall, the man in charge of it looks for a place on the floor where the slaughtermen have finished skinning a carcass and there deposits it.

Dressing and Skinning the Carcasses.—The slaughtermen or dressers at once begin to remove the skin from the carcass, with the exception of the part which is next the floor, that is down the centre of the back. The sternum is sawn through, as also the pelvis, the abdomen is opened, the omentum removed, and the carcass is again pulled up by an electric hoist; as it is being hoisted the head is removed and the internal organs pulled out on to the floor and the skin removed from the back. Two men with a double-handled or cross-cut saw then divide the vertebræ, and the carcass now hangs in two halves called "sides" of beef.

If the carcass is found free from disease by the inspector, it is pushed away to make room for another. If it is found diseased it may be at once sent with all the organs for destruction, or it may be sent to the detention room for further examination. Two men now begin to wash, trim and clean the sides of beef; the method of trimming and finishing is somewhat similar to that in this country, but the method of washing is far superior.

In some of the abattoirs in England an old wooden tub is used to hold the washing water. This water is often not changed during the whole day's work, but has fresh water added to it when required. The cloths or swabs being pieces of old meat wraps, by means of which the sides of beef are washed down, invariably these cloths are never properly scalded or kept as clean as they ought to be, and in some cases are used from day to day until worn out and discarded and then replaced by another of similar material.

In the Frigorificos a good system is adopted of having a tank fixed above the dressing place. In this water is kept at a suitable temperature and conveyed by means of an india-rubber pipe in such a way that it can be attached to the middle of a brush made of fibre through which a hole is bored into the back, and thus a steady stream of clean fresh water continually flows through the brush so that the same water is never used twice, and the brush is scalded at the end of each day's work. I examined these brushes and found them quite free from any objectionable matter, and they bore evidence that the statement just made was carried out, namely, as to scalding daily.

DISPOSAL OF THE CARCASSES AND OFFAL.

The sides of beef are now sent by rail towards the entrance of the refrigerators, where they are allowed to hang until a number have accumulated, sometimes about an hour's duration. They are then classified; those intended to be frozen are put into the chambers at a temperature of 10° F., those intended to be chilled into a temperature of 29° F., where they are kept until ready for shipment, the time depending upon the demand of the British markets.

Prior to being shipped they are stamped, weighed, graded, labelled, and put on board the transporters or ocean steamers.

SHEEP.

Sheep are slaughtered in the same manner as in this country, that is by placing them on a crutch, a knife is passed quickly through the neck, the main blood-vessels are severed, also the spinal cord. The carcasses are dressed in a similar manner in all large factories, namely, on a hook and not on the floor as in the London method.

After being skinned the carcasses, if sound, are thoroughly cleaned; in some places they are put on a travelling rail, on which they are graded, then weighed, stamped, labelled, and passed into the refrigerators at a temperature of about 10° F.

BOVINE OFFAL.

Having described how the carcasses are handled it is interesting to observe how the offal or by-products are disposed of. It is here that the great difference exists between the old methods existing in this country and the modern methods of the Frigorifico owners in operation in South America. As briefly as possible, consistent with giving the necessary details, I here describe what is done with all the offal.

Blood.—As all the animals are bled at one place, the blood enters into a tank from which it is forced through pipes to the compartment where it is steamed, pressed, and ultimately dried for use as blood manure.

In some Frigorificos great care is taken to obtain the blood as pure as possible, and the finished product showed $17\frac{1}{2}$ per cent. of ammonia.

Hides.—The hides are fleshed (in some places by machinery, in other places by hand), that is to say, any pieces of the sub-

cutaneous tissue left on the hide is cut off, the hide is then washed, scrubbed and sprayed, next put into a wet pickle for some hours and ultimately taken out, classified, put into packs, with dry salt between each hide and kept for about three weeks. They are sold to the highest bidder irrespective of what country he comes from.

Hair from Tails.—The hair taken from the end of the ox tails is washed, dried and exported, being used for furniture stuffing, &c.

Feet.—Feet are disposed of in a variety of ways: the leg bones from them are washed, boiled, dried and sent away to make knife handles, &c., the tendons are dried and sent away to make glue. The hoofs are dealt with in a similar manner. From the internal portion of the foot Neat's foot oil is extracted.

Horns.—The horns are dried, boiled down, ground and used for fertilizer. The piths from the horns are dried and sent away to make glue.

Heads.—The flesh from the sides of the head (termed head meat) is washed, cleaned, frozen and exported. The skull is split down by means of patent machinery or by hand labour, the brain being left undamaged. The bones are ground down, digested, and used for fertilizer.

Brains.—These are taken carefully from the head, washed, cleaned, frozen and exported or sold locally.

Tongues.—The tongues are washed, trimmed, put into moulds to give them the proper shape, frozen, then put into boxes or bags and exported.

Sweetbreads.—The thymus or sweetbread is washed, trimmed, frozen and exported, and in some cases sold locally.

Lungs.—All the lungs are put into the digester, the majority being affected with parasitic disease.

Hearts.—The hearts are washed, frozen, put into boxes and exported; in some cases they are cut up and used for meat extract.

Livers.—Only a small percentage of the livers are found free from disease (parasitic); those passed as fit for human food are washed, frozen and exported. Those found diseased are put into the digester for fertilizer.

Pillars of the Diaphragm.—The pillars of the diaphragm (termed by the trade "thick skirts") are trimmed, frozen, packed and exported.

Œsophagus.—The muscular portion of the œsophagus is frozen and exported. The connective tissue portion is cleaned, dried, blown up, tied at each end and sold as "weasands," and used for sausage casings.

Thyroid Glands.—In some places the thyroid glands are dried, desiccated and exported.

Suprarenal Bodies.—In some places these are preserved and exported.

Gall.—In some of the Frigorificos, after the gall is collected, a little antiseptic is added, it is then placed into barrels and exported.

Bones.—The skulls and bones cut from the carcasses, &c., are put through a bone-crushing machine, then into the digester, and used for fertilizer.

Stomachs.—Portions of the stomachs are washed, scalded, scraped, frozen and exported.

Spleens.—The spleens are all put into tankage (digester).

Omentum and Mesentery.—The fat of the omentum and mesentery, if free from disease, is converted into oleo; if diseased it is put into the digester.

Intestines.—The intestines are carefully washed, inverted, scraped and carefully examined, any diseased parts cut out, then salted, packed and exported. The diseased parts are sent away to the digesters. From a certain portion of the intestines gold beaters' skin is taken and preserved.

Kidneys.—If the kidneys are not left in the carcase they are cleaned, frozen, packed and exported.

Tails.—The tails are cleaned, frozen and exported.

Trimnings from Carcasses.—The trimmings are all carefully collected and sent to the digesters.

Bladders.—The bladders are cleaned, blown, dried and exported.

Generative Organs.—Those are all carefully collected and sent to the digesters.

Floor Sweepings.—All the floor sweepings and small pieces of fat are carefully collected and sent to the digesters.

SHEEP OFFAL.

Blood.—The blood is disposed of in the same manner as from the oxen.

Heads.—In some cases the heads were put into the digesters

without the flesh from the cheeks being previously removed. In other cases the flesh was sent to the canning department.

Tongues.—The tongues were cut out, salted, boiled and canned.

Lungs.—The lungs, as in the case of the oxen, were generally found affected with parasitic disease, and all sent to the digester.

Hearts.—These are washed, frozen, packed and exported, and in some cases they are converted into extract.

Thyroid Glands.—These are treated in a similar manner to those of oxen.

Supra-renal Bodies.—These are also treated in the same manner as in oxen.

Livers.—In the majority of cases the livers are found affected with parasitic disease and sent to the digester.

Stomachs.—The stomachs are all sent to the digester.

Intestines.—The intestines are treated in the same manner as in the case of bovines.

Bladders and Generative Organs.—These organs are also sent to the digester.

Kidneys.—The kidneys are cooled, packed, frozen and exported.

Fat.—The fat from the carcasses which are found fit for human food is sent to the oleo department, but from those found affected with disease it is all put into the digester.

Feet.—The feet are all put into the digester for fertilizer.

Sheep Skins.—The sheep skins are sent to the fellmongering department. It would take too long to describe minutely the whole of the process, but the following is a brief description:—

The skins are soaked and washed, all clots taken off, then dried, painted with a solution, and the wool pulled off.

The wool is put through a drying machine, then packed into bales by means of an hydraulic press and exported.

The pelts are washed and put through a series of processes, packed into barrels and sent to the United States.

As showing the care that is taken of all by-products, and that everything is used that can be converted into money, in some places even the contents of the stomachs are pressed and used as fuel in the furnaces, and the water collected from the floors, &c., passes through catch pins, from which the fat is skimmed off and returned to the digesters.

FRIGORIFICOS IN URUGUAY.

As these two Frigorificos are managed by Messrs. Sansinena Co. and Messrs. The Swift Beef Co., the plans of the premises and the whole method of doing business is very much on the same lines as in the Argentine factories.

All the inspectors, although they are officers of the Government, are practically paid by the owners of the Frigorificos. because the latter are charged by the Government a certain sum for each officer supplied. In the Argentine Republic the owners of the Frigorificos pay to have the meat inspected, but have returned to them all unsound food, it being put into the digesters under supervision, while in this country the local authorities supply meat inspectors free of charge, but in general (some places excepted) retain all unsound food seized. A further very great difference exists between the two countries in that the Government in Argentina accept full responsibility for the inspection of the meat, while in this country the owner of the meat is supposed to have sufficient knowledge of disease to prevent him exposing any unsound meat for sale for human consumption, and the inspection is carried out on the detective principle, that is to say, the inspectors look for unsound food, and in many cases prosecute the owner of the meat if he has exposed for sale, prepared for sale, or deposited in any place for the purpose of sale, meat which is unfit for the food of man.

The Frigorifico owners must provide suitable detention rooms in which all doubtful carcasses may be placed until a final decision is given on them. In addition, office accommodation and laboratories must be provided for the use of the veterinary inspectors and their assistants.

During 1912-13 the undermentioned beef was found affected with tuberculosis in the Central Markets: 60 hindquarters of beef, 18 forequarters of beef, 14 top pieces of beef, 4 flanks of beef, 1 aitch bone of beef, 5 rumps of beef, 1 loin of beef.

As a result of complaints made from the Corporation of London as to the above diseased meat having been found in the Smithfield Markets, the Minister of Agriculture considerably increased the number of inspectors at the Frigorificos.

The following figures show the increases, and I was informed that a proposal to appoint other additional officers was under consideration, due to an increase in the number of animals being slaughtered at the Frigorificos and the desire of the Minister of

Agriculture and his responsible officers that the work should be done in a manner thoroughly satisfactory to the authorities of the countries to which meat is exported:—

TABLE SHOWING INCREASE OF INSPECTORS.

Frigorifico		1911		1913		1911		1913	
		Veterinary Surgeons		Veterinary Surgeons		Assistants		Assistants	
La Blanca	...	...	4	...	8	...	4	...	9
La Plata	...	...	5	...	9	...	2	...	10
La Negra	...	...	5	...	10	...	5	...	13
Campana	...	...	2	...	3	...	4	...	6
Las Palmas	...	...	2	...	3	...	3	...	6
Frigorifico Argentine	...	...	2	...	—	...	2	...	—
Zareta	..	...	2	...	4	...	4	...	4
		22		37		24		48	

Those figures show increases of 68 per cent. veterinary surgeons and 100 per cent. assistant inspectors.

From practical experience I estimate that an inspector can satisfactorily examine 100 beef carcasses or 500 sheep carcasses per day of eight to ten hours. If he has to do more than those numbers he becomes tired at his work, which is monotonous, and will probably miss some lesions of disease.

Taking the above figures as a basis, the following analysis shows a very great difference in the allocation of officers in the Frigorificos:—

Frigorifico	Animals killed per day					Estimated number of men necessary	Number of men actually present on duty			
La Blanca	...	1,000 cattle at 100 per day per man					10	17		
La Plata	...	1,550	„	100	„	15	26	19		
„	...	5,500	sheep	„	500	„			11	
La Negra	...	1,050	cattle	„	100	„	10	15	23	
„	...	2,550	sheep	„	500	„	5			
Campana	...	900	cattle	„	100	„	9	14	9	
„	...	2,500	sheep	„	500	„	5			
Las Palmas	...	600	cattle	„	100	„	6	12	9	
„	...	3,000	sheep	„	500	„	6			
Zarate	...	600	cattle	„	100	„	6	6	8	
Totals							83	85

NOTE.—Frigorifico Argentino not included.

It will be seen that when taken together the totals come very near one another, but the distribution seems bad, for example:—

Let "plus" equal too many and "minus" equal too few, then:—

La Blanca	...	=	...	plus 7
La Plata	...	=	...	minus 7
La Negra	...	=	...	plus 8
Campana	...	=	...	minus 5
Las Palmas	...	=	...	" 3
Zareta	...	=	...	plus 2

It may be argued that any inspector can examine more than 100 beef carcasses and 500 sheep carcasses and offal per day; that, of course, depends entirely upon the percentage of disease found among the animals. Personal experience of Argentine stock at the Deptford Cattle Market and observations as to the percentage of disease found in the Argentine offal convince me that the number previously allotted to each inspector is the maximum that should be given in order to secure efficient inspection.

Qualifications of Veterinary Surgeons.—All the veterinary surgeons are graduates of either Las Palmas or Buenos Ayres Veterinary Colleges, both of which are affiliated to the Buenos Ayres University.

Qualifications of Assistant Inspectors.—The assistant inspectors are men selected from practical butchers when they can be obtained; if not, then from men who have had experience in the handling of meat.

They are trained by the veterinary surgeons, but do not pass any examination, and further do not hold certificates as proof of their knowledge of the duty entrusted to them, although I was informed that they did not pass or condemn any doubtful meat, but simply called the attention of the veterinary surgeons to abnormal appearances in carcasses and organs.

DESCRIPTION OF THE SYSTEM OF MEAT INSPECTION IN THE FRIGORIFICOS.

The meat inspection and hygiene in each Frigorifico is under the entire control of a chief veterinary surgeon, who has under him a staff of veterinary surgeons and lay assistant inspectors.

Ante-mortem Inspection.—The owners of the Frigorificos must give at least twenty-four hours' notice prior to the arrival of the animals at the corrales as to the number expected and the district from which they are arriving. If from a public market, a veterinary certificate stating that the animals are free from contagious disease must accompany them and be handed to the chief veterinary officer at the Frigorifico.

On arrival of the animals they are inspected, and any apparently doubtful are at once removed, either for careful observation or immediate slaughter. If the latter, a *post-mortem* examination is made in a special slaughter-house.

If the disease is of a contagious nature, *e.g.*, anthrax, the

carcase and all organs are at once destroyed, and everything which has been in contact is disinfected; the remaining animals are kept under careful observation until they are slaughtered.

Method of Examination.—Immediately the carcase of a bovine animal is hoisted from the ground a veterinary inspector with an assistant takes on the examination of the organs as follows:—

Head and Tongue.—The palates are examined, then the lymphatic glands (retropharyngeal and submaxillary) incised.

Lungs.—These are palpated, the glands (bronchial and mediastinal) incised.

Heart.—The heart is extracted from the pericardium and examined.

Liver.—The liver is palpated and the hepatic glands incised. If any abnormal appearances are observed in the organ an incision is made to ascertain its nature.

Stomach.—The stomach is examined for evidence of disease and the lymphatic glands incised.

Spleen.—The size and appearance of the spleen is carefully noted.

Mesentery and Intestines.—^aThe appearance of the intestines is noted and the chain of mesenteric lymphatic glands is incised.

Generative Organs.—Appearance is noted, and, if necessary, incisions are made.

Carcase.—While the organs are being examined the carcase is sawn into two halves. The inspectors now direct their attention to these portions, the bones of the vertebræ, &c., are noted, then the serous membranes. If all the organs and carcase appear normal, the organs (tongue excepted) are passed. The tongue is washed, hung up and again examined by another inspector, who notes if the lymphatic glands have been incised and that no lesions are apparent, as it is possible to fail to observe a small lesion if it be covered with blood at the first examination.

The carcase is pushed along the rail on which it hangs, and after being carefully washed and trimmed, it is again examined by another inspector in order to look for lesions which may have escaped the observation of his colleagues. If no lesions are found at the second examination the carcase, now in two sides, is passed, stamped and pushed along towards the entrance to the refrigerators.

Sheep.—Immediately the carcasses of sheep and lambs have

been "dressed," that is, skinned and washed, the veterinary inspector and assistant examine the "pluck," which consists of the lungs, heart, liver and spleen; then the carcase by observing the serous membranes and palpating the parts containing the precrural, inguinal and prescapular lymphatic glands.

If the organs and carcase are free from disease they are passed, and the carcase is then put on the "grading rail," stamped, and subsequently placed in the refrigerators.

Carcases free from disease, but too poor in quality for freezing, are sent to the canning department.

Pigs.—Very few pigs are killed in the Frigorificos, and those only for local consumption. After the "pluck," that is, the lungs, heart and liver, has been detached from the carcase, the veterinary inspector and assistant examine the lungs by palpating them and cutting into the lymphatic glands. In a similar manner the liver is examined and the appearance of the heart is noted.

The carcase is then examined, the appearance of the serous membrane noted, the lymphatic glands of the head incised and portions of the carcase excised for special examination for trichina; if the carcase and organs are normal they are passed, stamped and loaded into vans for removal to the city shops.

The foregoing description applies to normal carcases. Argentine animals are very free from diseases (aftosa and parasitic diseases excepted).

From personal experience of them at Deptford Market, examination of imported offal, and observations at the Frigorificos, the undermentioned diseases are most common amongst the animals:—

Cattle. — Actino - bacillosis, actinomycosis, distomatosis, echinococcus veterinorum.

Sheep.—Caseous lymph-adenitis, distomatosis, echinococcus veterinorum.

Pigs.—*Cysticercus cellulosæ*, tuberculosis, trichina.

Carcases and all the organs absolutely normal are not very common; the beef carcases are, with the exception of a very small percentage, very free from disease, but the reverse applies to the organs, especially the lungs and livers, these being extensively affected with parasitic disease.

Carcases exported from Argentina to Holland must have the lungs, liver and spleen left *in situ*, and I was informed that only

a small percentage of carcasses were found suitable for these requirements, the carcasses being generally free from disease, but one or more of the organs showed lesions generally parasitic.

As in all systems of meat inspection, if disease is "localized" in certain organs, these are destroyed and the carcase passed, but where the disease is one that might be called systemic, then care has to be exercised in dealing with the carcase and organs.

GENERAL REMARKS.

In describing the buildings and fittings, also the health and cleanliness of the employees, transporters, loading of meat, steamers, &c., criticisms have been made, the chief of which are as follows:—

(a) The use of too much wood in some places instead of impervious material.

(b) The necessity of enforcing the wearing of overalls by those handling meat for human consumption.

(c) The bad arrangement of the buildings in some of the Frigorificos, that is to say, the offensive trades being conducted in too close proximity to where food is prepared.

(d) Necessity of paving the approaches and surroundings of the Frigorificos.

A SUGGESTION.

During my investigations in Argentina I formed the opinion that a good veterinary officer attached to the British Legation in Buenos Ayres could perform much useful work.

Similar officers are stationed in London acting on behalf of the Argentine, Australian, New Zealand and United States of America Governments.

So strongly was I impressed with the idea that I asked the opinion of a number of importers of pedigree stock, the Managers of Frigorificos, &c., all of whom stated that such an appointment is highly desirable, and importers of live stock at once expressed the desire, if such an appointment were made, to pay a proportion of such an official's salary. These importers stated that for a very long time they have felt the want of a good reliable expert to watch the interests of Great Britain in connection with imported animals.

The officials of the Direccion General de Ganaderia in Buenos Ayres would welcome such an officer and in return for the

kindness shown to their veterinary surgeon in London would extend every facility to the representative from Great Britain.

SUGGESTED FUNCTIONS OF SUCH AN OFFICIAL.

The officer could make careful observations, by visits, as to the system of meat inspection existing and the class of meat used, also the hygiene in the canning of foods, extract of meat, powdered meat, &c., in the Frigoríficos, factories, &c.

The presence of such an officer making periodical visits would greatly tend to keep the inspection and class of goods used, also the hygiene, at a high standard, and this is very necessary as no inspection of tinned foods, &c., can be perfectly carried out after its arrival in Great Britain.

That an important duty exists in this matter can be shown by the following figures, which show the exportation from Argentina in 1910:—

	Value in gold dollars.
Extract of meat... ..	3,916,680
Tinned and salted tongues	284,352
Powdered meat	1,267,964
Preserved meats	1,208,187
Concentrated soups	204,293

The above figures are in addition to carcasses of mutton and quarters of beef (frozen and chilled) sent into this country.

The officer could attend *post-mortem* examinations at the Quarantine Station of pedigree animals, killed after having been tested with tuberculin. This would be very important work; the results of the various testing systems could be definitely ascertained as no place could give so conclusive results as one where animals are slaughtered after showing reactions to tests.

The system of controlling contagious diseases could also be carefully watched. At present a new bacteriological institute is being erected in Buenos Ayres, and judging from appearance will not only be one of the finest in the world, but the methods adopted in connection with the control of diseases and scientific research will be on the most modern principles.

Attempts will be made to control, and if possible to stamp out, "aftosa" (foot-and-mouth disease); such work carefully watched and reported on would prove of great value to the British Board of Agriculture.

A new Order has just been issued making it compulsory that

all pigs imported into the Argentine Republic are to be tested with tuberculin. The results will prove interesting, and in many ways the officer's annual report would be of great educative value.

The officer could also direct his attention to the exportation of horses to Great Britain. It is believed that there is a great future in Argentina in the breeding of Army horses for other countries.

He could also perform the same duties as the United States of America require their officer to perform—namely, attend to the disinfection of all hides, &c., exported to Great Britain. Large cargoes of maize are exported from Argentina, and it is possible that this grain, which is intended for animal food, may be put into vessels which have previously conveyed hides, hoofs, &c., and not been properly disinfected.

He could also keep the British Board in full information as to the prospects in Brazil, Argentina, Venezuela, Uruguay, and Paraguay of new districts being opened up for the supply of beef cattle. This is a very important question owing to the prospects of a scarcity of beef throughout the world.

H.I.M. THE EMPRESS OF RUSSIA has favoured the proprietors of Dr. J. Collis Browne's Chlorodyne with a large order for that famous medicine to be sent to Russia. As is well known, Dr. Browne's Chlorodyne is a sure preventive and curative of dysentery and other intestinal complaints.

Translation.

PARASITIC CATARACT OF ROACH.

By DR. JUGEAT,

Veterinary Health Department of the Seine.

IN 1912 our attention was called to some exorbitated roach, and we endeavoured to trace the cause of the lesions. We noticed that a large number of the subjects of the same species and from the same region had a variable opacity of the pupil involving the crystalline lens, or, in other words, cataract.

Finally, microscopic examination revealed the presence of young trematodes in the interior of the lens analogous to those observed in perch in Germany, but which to our knowledge have not yet been seen, at least with such frequency, in roach.

The roach infested came from Dutch waters, at the mouth of the Meuse and Rhine; their appearance was not first-class; they were small in size, thin, soft, scales easily removed, &c., the majority of these characters showing damage to the general condition of the fish. In the lots examined it was always possible to find a certain number of subjects that had lost one or even both eyes, the orbit was absolutely empty, gaping, with a little whitish spot in its depth, the termination of the optic nerve. The exorbitation appeared recent. In another fish the eye showed no other lesion, but a turbid appearance, more or less accentuated, of the corresponding pupil, or, as we have written, an opacity of the crystalline lens. This latter had preserved its transparency in numerous individuals, but in advanced cases the opacity was absolute, the lens was as white as that of cooked fish, not allowing any light to filter through, and the fish was blind. In general the two eyes were affected to the same degree.

Under the microscope the crystalline lens, crushed between two slides, showed some very curious parasites alive and mobile, which we recognized as *Diplostomum volvens* (Mordmann), larvæ of *Hemistomum spathaceum*, a frequent trematode of aquatic birds, in the intestine of which it attains its adult form.

Diplostomum volvens is a little foliaceous trematode, somewhat similar to a distoma, but without a very fixed form, for it moves itself by reptation, drawing itself up and retracting itself, forming itself into a ball or curving itself in every direction; in short, without exaggeration one can compare its movements to those of an enormous amoeba. Its shape is like an elongated bottle. It has an anterior extremity provided with three auricles, and a short prolonged posterior extremity like a sac. There are two vents—an oral one, very small, and a ventral one, very marked.

These larvæ involve the whole of the crystalline lens when the malady is advanced; but at first, when the lens is still transparent, the diplostomes are only encountered at the level of the anterior face, immediately behind the crystalloid.—*Hygiène de la Viande et du Lait*.

Reviews.

Castration (including Cryptorchids and Caponing) and Ovariectomy. By Frederick T. G. Hobday, F.R.C.V.S., F.R.S.E. 80 illustrations in the text. Published by W. and A. K. Johnston, Ltd., Edinburgh and London, 1914.

This little volume of 160 pages may be described as the standard textbook of castration and ovariectomy in the English language. Those about to conduct these operations for the first time cannot read any better instructions than are given in the pages of this book, and those who fancy they know all there is to know on the subject may pick up some helpful wrinkles from a past and present master of the science and art. This second edition is a considerable advance on its predecessor, and includes fresh and valuable matter in the shape of a chapter from the pen of Sir John Bland-Sutton, F.R.C.S., on "Abnormalities of the Sexual Glands of Man and Horses"; illustrations of the castration of cryptorchid sheep, by Mr. Inglis, M.R.C.V.S., of Forfar; and an illustrated article by Mr. Stanley Elley, M.R.C.V.S., on the "Caponing of Ostriches."

The book comprises ten chapters, dealing respectively with: Castration, scrotal hernia, the castration of cryptorchid horses, cryptorchidism in other animals, caponing of fowls and ostriches, observations upon the effects of castration in animals, ovariectomy and hysterectomy of troublesome mares, ovariectomy of cattle, ovariectomy and ovaro-hysterectomy of the smaller animals, abnormalities of the sexual glands of man and horses.

In reference to castration standing by the clam method the author says: "The clam may be a clean, wooden one, used clean, &c." Throughout his work Mr. Hobday always advises surgical cleanliness, and we are certain that the great percentage of his fine successes are due to observance of this tenet. Regarding castration standing, we prefer to have the attendant turning the colt's head round slightly to the near side, and following our animal round (as he moves) on the near side as he travels or moves round a loose box or enclosed space. When operating with the *écraseur* and with the subject on his feet it is often an advantage to have him blindfolded. Methods of casting colts for castration are described and special mention is made of Mr. W. C. Hazelton's and Mr. T. H. Parker's modes of procedure. The chapters on cryptorchidism and ovariectomy are strong features of the book, well written, lucid, and the fruit of ripe and extensive experience. Throughout, the work is abundantly illustrated, many of the pictures being unique of their kind. The volume is well printed, tastefully bound, and should find a place on the bookshelf of every practising veterinary surgeon. We feel sure that if pressure of work had not hindered the author from giving his time to writing, this second edition would really have been a third or

fourth one. A much less lucid treatise on the same subject has gone into its sixth or seventh edition in America.

Mr. Hobday dedicates his book to Professor Cadiot, of the Alfort Veterinary School, as a token of esteem and friendship.

G. M.

The Journal of the Board of Agriculture, September, 1914.

This is a number of the well-known journal which will be chiefly of interest to veterinarians by reason of its containing articles on "The Cultivation and Collection of Medicinal Plants in England," by W. A. Whatmough, B.Sc., and "The Value of Acorns, Horse Chestnuts and Beech Mast as Food for Stock." The former subject is well illustrated, fields of belladonna, English dill, aconite, foxglove, golden seal, henbane, datura, and valerian being shown.

With regard to acorns it is written that "it seems to be established that dried and shelled acorns may be fed in the ration to all animals without hesitation and with good results." This is the way they are often fed on the Continent, and we quite agree with the statement. The French have a way of telling those acorns that are injurious, for they separate and throw away all specimens of the fruit that float when thrown into a tub of water. They also discard any unsound specimens. When dry the acorns may be ground into meal or crushed, and are then said to be willingly eaten by sheep and oxen. For pig food one observer suggests that acorns are roughly worth per ton about half the price of maize. Store pigs will not get fat on them, but they will grow strong frames on which meat can be laid cheaply subsequently. Pigs do quite well on them when turned out and getting other natural green food as well. Dried, husked, and ground chestnuts have been eaten satisfactorily by cattle and sheep, and beech mast has been fed to poultry and turkeys with good results as a fattening food. For the rest this number of the *Journal* is especially strong on small but important things, such as notes on poultry feeding, poultry on allotments and garden plots, poultry as farm stock, storage and disposal of apples and pears, fruit preserving, &c.

Altogether we consider that this September issue is certainly one of the most useful and interesting ever published by the Board of Agriculture and Fisheries.

G. M.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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THE VETERINARY JOURNAL

NOVEMBER, 1914.

Editorial.

THE ARMY VETERINARY CORPS AT THE FRONT.

EVERYBODY, whether in the Service or out of it, has his thoughts turned to the war and to those who are actively engaged in the present struggle against military despotism. The Army Veterinary Corps is playing its part, and that part is one of no inconsiderable importance, for the work done by the cavalry of either side has shown the necessity for the efficiency of this branch of the Service to be just as great in this, the most terrible war which the world has ever known, as it was in the battles of a century ago.

Aeroplanes, motor-cars, and all other forms of reconnaissance and transit are each very much to the front to-day, but the cavalry soldier is still with us, and no one knows better than he that his very existence depends upon the condition of his "mount." To keep his horses "fit" and to obtain the maximum use out of a cavalry unit the Veterinary Officer of the present day, up-to-date, scientific, and yet practical, with his modern ideas sensibly and usefully applied, is as essential to the other portions of a great army as the engineer officer, the commissariat department, the medical, or any branches of the whole machine which unite together to form the offensive or defensive armament of a country.

That the Army Veterinary Corps has again "justified its existence" is acknowledged on every hand, and in a recent editorial on the subject in the *Times* attention is drawn to the good work which it is doing in the veterinary hospitals and in the field.

It is stated that the horses in particular "are the admiration of everyone," and that "no doubt the excellent condition of the animals is in large measure due to the services rendered by the Army Veterinary Corps," whilst in a later paragraph, after alluding to the thousands of horses which are saved and rendered useful again, the writer goes on to say that "the work of the Army Veterinary Corps may have a very important bearing on the

campaign," as "chargers are not made in a day," and that "any horse which can be saved now by our Army Veterinary Corps may be worth six later on."

We have our great chance as a professional unit of the Army to "justify our existence," and the country has only to look at the manner in which our men have voluntarily come forward to know that we, as a profession, are as anxious as every other body of Britishers to do our share in defending the civilization and liberties of Western Europe from the disciples of Treitschke and von Bernhardt.

AN APPEAL FOR ACTIVE SERVICE NEWS.

EVERY officer, no matter to what department he may belong, is supposed to keep a "War Diary," and to the readers of THE VETERINARY JOURNAL, whether called up on duty or not, an interchange of ideas will be most instructive reading.

There are few, indeed, connected in any way with the Army Veterinary Service who could not give suggestions or furnish scientific records which would be of the utmost profit for future practice and substantially advance our methods of treating the animal to whose welfare we devote so much of our professional service. The civilian veterinary surgeon who attends the horses of a regiment in his district and sees for the first time the difference between the treatment of his patients in out-door sick lines and warm comfortable stables will be able to learn therefrom much of the utmost importance to record for our future guidance. The whole-time Territorial Veterinary Officer in Great Britain, who is similarly placed but who is able to be with his patients all day, will be able to think out and suggest improvised methods which he would scarcely have thought possible under ordinary circumstances and which will certainly be of importance and interest to others similarly placed. And the veterinary officer who is on foreign service, either in a modern up-to-date hospital of the base, a field hospital, or perhaps attached to a regiment actually in the firing line, can afford us news and scientific records of the utmost value.

To each of these sections of the profession we appeal for such information and records, however roughly compiled. We shall be most happy to do all necessary editing and most cordially to afford them the hospitality of our pages.

General Articles.

STUDIES IN THE IMMUNITY TO TUBERCULAR DISEASE.*

I.—THE CASEATION OF THE TISSUES.

By CHARLES C. TWORT, M.D. Aberdeen.

Beit Memorial Fellow.

An important factor in tubercular disease is the caseation of the tissues, and the most prominent difference between this disease and leprosy is the absence, in most cases, of caseation in the latter. The question as to why the tissues caseate in some of these diseases and not in others, and why in such a disease as leprosy in the late stages of the infection caseation may sometimes be found, are of extreme interest in considering the immunity in these diseases.

According to Koch's classical hypothesis, on inoculation of tuberculin into a tubercular patient, the result of the reaction obtained is a dissolution of the tubercular tissue, which renders this site unsuitable for the further development of the specific bacillus. Thus it was considered that tuberculin acted against the tissues and not against the bacilli, and the destruction of the tissues led to death of the bacilli. This is a feasible conception if tuberculin is considered as a toxin *per se*; but at the present time it is not believed that the essence of the tuberculin reaction is due to the primary toxic effect of the tuberculin, but that an opposite state of affairs exists to that above described. From the results of my own work on acid-fast bacilli it would appear rather that it is not the soluble toxin of the tubercle bacillus which leads to caseation of the tissues, and this in turn to death of the bacilli; but, on the contrary, that the bacilli are killed by the cells and fluids of the host, and the dissolving of the bacilli and the subsequent diffusion of the endotoxins leads to death of the surrounding cells. [1]

If we consider the state of affairs in such diseases as Johne's disease and leprosy we find that the number of causative bacilli present is enormous, while caseation is absent; on the other

* From the Laboratories of the Brown Institution, University of London.

hand, in tuberculosis the number of bacilli may be scanty, with a generalized caseation of the tissues. It may be objected that although caseation never occurs in pseudo-tuberculous enteritis (Johne's disease), it does occur in leprosy, both of man and rats. I do not deny that a slight degree of true caseation may take place in leprosy, as, for example, when the bacilli are for some reason killed by an influence but rarely present in this disease, or in old slowly growing encapsulated nodules, but the tissue necrosis found in leprosy is usually of quite a different nature. If the purulent discharge from an uncontaminated leprosy lesion be examined microscopically, or still better, if a broken-down abscess in a rat be examined in the same way, it will usually be seen that the material consists almost entirely of bacilli together with a little cell *débris* and a few well-formed cells full of bacilli. There is but little granular material similar to that found in a tuberculous caseous mass, and it is evident that the liquefaction of the tissues in leprosy is simply due to the fact that it has all been utilized as food, and nothing left to act as a framework for the support of the bacilli and cells. It is significant that the few intact cells that remain appear to be quite normal, while in the centre of a tubercular caseous mass no single intact cell is demonstrable.

What are the conditions that govern the caseation of the tissues in these diseases, and why do we find this strikingly different state of affairs? Is it because the lepra and pseudo-tuberculous bacilli secrete no soluble toxins and thus do not injure the surrounding cells, and consequently escape distraction themselves, or is it because they are naturally more resistant to the fluids of the host, and in the absence of a wholesale destruction of the bacilli the tissues remain unaffected? Although I am of the opinion that no soluble toxins are secreted by these two varieties of bacilli, I believe the second factor to be the more important in relation to the absence of caseation, which view I consider to be supported by the fact that the inoculation of dead acid-fast bacilli of whatever variety invariably leads to caseation of the tissues. I have inoculated a large number of animals with Johne and lepra bacilli, and have found caseation almost always to be absent when using living bacilli, while it is invariably present on the injection of dead bacilli. In those cases in which caseation has occurred with the former the animal was

either immune to the bacillus or some other factor had influenced the humours of the inoculated animal in such a way as to cause death of the bacilli soon after inoculation. I have performed experiments which bear upon this subject, and which showed that on the inoculation of a series of normal animals with rising doses of an acid-fast bacillary vaccine a certain number of the animals will show caseous abscesses at the site of inoculation, while the skin of others remains absolutely clean, even after six injections. Rabbits inoculated intraperitoneally with an emulsion of Johne's bacillus will sometimes show large caseous masses in the abdominal cavity, while in others, under exactly similar conditions, the whole of the peritoneal membranes are quite clean. However, in discussing this question I am considering only those animals that have undergone a single inoculation, as a second injection of living bacilli will usually cause caseation. In the second inoculation the bacilli have to withstand the influence of the anticorps that are produced against the primary inoculation, and if they succumb to these anticorps then caseation of the tissues occurs as a result. It does not generally happen that all the bacilli of the second injection are at once killed out; it is only a certain number that are unable to survive, and these are sufficient to lead to intoxication of the surrounding tissues.

In some animals that are peculiarly resistant to Johne's disease, such as guinea-pigs, caseation is very frequently found in the peritoneal cavity after a single intra-abdominal inoculation, and when the contents of these caseous masses are tested on culture media they are invariably found to be sterile. It may be taken as a general rule that in caseous tissue a large number at least of the bacilli seen on microscopical examination are dead, and if no bacilli at all are found it may be safely assumed that those originally present have been destroyed and already dissolved. It is interesting to note that in general paralysis of the insane there are usually not many spirochætes in the degenerated tissue, but they are found in greater numbers in the neighbourhood of the latter. Here it is quite possible that it is the death and disintegration of the spirochætes that has led to degeneration of the tissues in which they were present.

In such affections as leprosy and pseudo-tuberculous enteritis, even in a caseous mass, the number of bacilli present is usually enormous; in fact, whether in caseous or apparently normal tissue

these two varieties of bacilli are almost always very abundant. The probable explanation of this lies in the fact that they are peculiarly resistant to lysis, for when heated emulsions are inoculated into animals it is found that Johne's bacillus can be demonstrated long after the tubercle bacillus has entirely disappeared.

It must be remembered that it is not in a single species of animal, but in all animals, whatever be their susceptibility to the tubercle bacillus, that caseation is found, while as a rule in all animals inoculated with Johne's bacillus caseation is absent. There is, however, an exception to the latter statement, for in the experimental inoculation of guinea-pigs caseation is often found, and this appears to be just the variety of animal insusceptible to Johne's disease, at any rate when intra-abdominal inoculation is resorted to.

Cattle, sheep, goats, deer, rabbits, rats, and mice have all shown themselves to be susceptible to the inoculation of Johne's bacillus, and produce evidence of the typical disease, without caseation, after varying periods of incubation. I have not inoculated guinea-pigs intravenously, but on intraperitoneal injection they do not contract the disease, and all that is seen on *post-mortem* examination are the caseous abdominal masses. Also up to the present time I have been unable to produce the typical disease in rabbits on intraperitoneal inoculation, the most I have obtained being the presence of a single bacillus in the region of the sacculus rotundus in one animal, and here again caseation of the tissues is frequently found. Among about fifty mice and rats inoculated in the same way I have never once seen caseation, and the animals frequently show definite histological signs of typical Johne's disease on *post-mortem* examination. In these fifty animals only eleven have contracted the disease, and it may naturally be asked, Why was there no caseation in the remaining animals? The reason for this is obviously because the bacilli have not been killed by the host, but have been mechanically excreted, and, as a matter of fact, I believe that the majority of these animals would eventually take the disease, as I have been able to recover the bacilli in pure culture from the thoracic and abdominal glands in practically every case. However, some of my mice had been inoculated for over a year without contracting the disease.

When rabbits are inoculated subcutaneously with *Bacillus phlei* it is especially the lungs that eventually become the seat of disease, and here one finds a caseating pneumonia with large abscesses, in fact a picture more or less identical with that found in tubercular lung disease.

On intravenous inoculation it has been shown [2] that the bacilli are excreted wholesale by the kidneys, but during the process of excretion the bacilli multiply rapidly in these organs and excite an intense leucocytic invasion. In this situation there is naturally a certain amount of destruction of the cells due to the mechanical pressure exerted by the invading bacilli and cells; but true caseation is always absent, the bacilli being gradually filtered out living, and the absorption of the lymphocytes following closely on the excretion of the agent that excites their invasion.

Again, in my experiments on the immunization of rabbits to Johne's bacillus by the inoculation of material other than acid-fast bacilli or their products, I have shown [1] that if the animal be highly immune, then on the injection of Johne's bacillus the animal collapses and dies owing to the intoxication by the products resulting from the wholesale destruction of the injected bacilli. If the animal be only partially immune, it does not die as a result of the injection of the bacilli, but if it be killed about a month later the peritoneal membrane is found to be covered with caseous masses, and, although from these masses a few isolated colonies may be obtained, it is evident from the number of bacilli seen histologically that the vast majority of them are dead. As we have seen, many normal animals may react in a way similar to these partially immune animals.

When inoculating animals with the object of obtaining the production of complement-deviating and other anticorps, I have observed that as a general rule, at least with the acid-fast group of bacilli, the inoculation of an emulsion of dead bacilli was instrumental in leading to the production of a far greater amount of anticorps than the inoculation of an emulsion of living bacilli.

Besredka and Jupille [3] observed that during the course of tubercular disease in rabbits a positive complement-fixation reaction was obtained, before microscopical lesions were evident in the organs. These authors found that the reaction ran parallel with the resistance of the animal, and the more resistant the

animal was for the injection the more intense and durable was the reaction. Thus, when inoculated with human tubercle bacilli, far better reactions were obtained than when using the bovine type. The probable reason for this is really that the inoculation of the human tubercle bacilli, very little virulent for rabbits, is more or less equivalent to the inoculation of dead bacilli, and from the above it will be seen that this should lead to the more easy production of a complement-fixing antibody than the inoculation of living virulent bacilli. It is obvious from this that the more resistant the animal the larger will be the amount of this particular anticorps produced.

Bang and Andersen [4] found that complement-deviating anticorps were more easily produced by rabbits, when they inoculated dead bacilli, than when they used a virulent strain. When the bacillus is dead the enveloping membrane probably becomes so altered that the passage of soluble material from within and without is greatly facilitated; thus the leucocytic ferments should enter, and the bacterial ferments escape more easily than in a living bacillus.

Lebedeff [5], by drying yeast and macerating it for two hours at 35° C., obtained a filtrate very rich in zymase, and thus the old method of pressure (Buciner) can be done away with. The drying is undoubtedly an important part of this process in allowing the ferment to traverse the wall of the cell, in the same way that dried acid-fast bacilli are preferable to moist bacilli for incorporating in Twort and Ingram's medium. In the animal body the bacilli, of course, never become dry, but disregarding this they will be fermented more quickly than living bacilli on account of the facility with which the specific ferment traverses the wall of the micro-organism.

The fact that in tubercular disease caseation and an intermittent temperature are predominant features, while the number of bacilli present is relatively small, and on the other hand in leprosy and pseudo-tuberculous enteritis an opposite state of affairs exists, in my opinion shows that there is a close relation between these different factors. In other words, as already mentioned, caseation, and a consequent rise of temperature, is only obtained at the expense of the death of the bacilli. This suggests a useful means for studying the effect of curative vaccines to leprosy and pseudo-tuberculous enteritis, and in-

directly to tuberculosis, for if the vaccines favourably influence the curing of the disease by directly or indirectly attacking the bacilli, which after all is the essence of a specific cure, then caseation of the tissues in the two first-mentioned diseases should become evidence, and one would be assured that the vaccine had, at any rate, a destructive action on the bacilli; and it would be reasonable to assume that properly administered it would have a beneficial effect on the patient. It is with the object of producing this caseation that I am at present engaged in studying certain non-acid-fast bacillary vaccines on rat leprosy and Johne's disease of cattle.

As Marchoux has pointed out [6], the results upon which numerous workers base the virulence of certain of their cultures, &c., of acid-fast bacilli, and the arguments that they use for maintaining the pathogenicity of the said bacilli for animals, should really be interpreted in an exactly opposite sense to that in which these authors are usually found to interpret them.

If the inoculation of an emulsion of a culture of one of the so-called leprosy bacilli produces caseation of the tissues, then, in my opinion, it proves that either it is not the true leprosy bacillus, or if it is, then it is not pathogenic for the animal inoculated. The same may be said of the marked complement-deviation reactions obtained in these animals. If the reaction is strongly positive then it is highly probable that the bacilli have been killed out soon after injection, for, as already mentioned, I have found that the inoculation of dead bacilli more readily leads to the production of complement-deviating anticorps than do living bacilli, results which are in accordance with those of Bang and Andersen, and which agree also with those obtained by Wassermann, &c., in their original experiments—I refer here to the experiments which have shown that it is far easier to demonstrate these anticorps in a patient who has undergone a course of tuberculin treatment than in those uninoculated with the specific remedy.

In conclusion, a short *résumé* may be given of what takes place in the presence of the tubercle or other bacilli producing caseation, and, on the other hand, what takes place in the presence of Johne's bacillus.

In the case of the tubercle bacillus, the soluble toxin secreted

does not probably act detrimentally on the surrounding cells, but may even act as a stimulant, so that phagocytosis of the bacilli is in no way interfered with. This toxin may have an influence in causing encapsulation of the diseased area, and thus more or less isolation from the other tissues of the body. Meanwhile the bacilli, both intra- and extra-cellular, but especially the former, commence to be disintegrated by the humours of the host. The products of this disintegration lead to a further fabrication of the specific lysin, while at the same time, if it becomes too great in amount, the animal cells are unable to survive, as the intermediate products of the breaking down of proteids are intensely toxic for the cells of the animal body. The increase of the specific lysin leads to further destruction of the bacilli, and this in turn to the liberation of more endotoxins, so that ultimately the cells inside the nodule are doomed to destruction. Thus the cells and bacilli within the constricted area react upon one another, and both in the end are killed out, the edges of the nodule, where the accumulated toxins can more easily be got rid of, being the only situation in which intact cells and bacilli can be found. Bacilli, apparently normal, may be found in the centre of the caseous mass, but rarely any intact cells; and it is quite probable that many of the bacilli here found are really dead.

In Johne's disease it is highly probable that little or no soluble toxins are produced, and the bacilli, although actively phagocytosed, are not toxic for the cells, and can live and multiply within them. At the same time, if a certain number of bacilli die or are killed by the host, the products of disintegration are better able to get away than in tubercular disease, as the lesions are never encapsulated, but blend more or less imperceptibly with the normal tissues. In leprosy the lesions are often encapsulated, but here again it is probably due to the non-toxicity of the bacilli for the cells, and especially on their ability to live and multiply within the cells, that there is an absence of caseation. The disintegration products of Johne's bacillus and the leprosy bacilli are as toxic for the animal as a whole, or locally for its tissues, as those of the tubercle bacillus, which is seen by the reaction produced on inoculation of a diagnostic vaccine on the one hand, and the effect produced by the inoculation of an emulsion of dead bacilli on the other, when with all three diseases, and with all three bacilli, the results are the same, that is to say, a rise of

temperature in the first case and caseation of the tissues in the second.

[1] TWORT, C. C.: "The Immunity to Tubercular Disease and Diseases caused by Micro-organisms allied to the Tubercle Bacillus," Thesis, Aberdeen, February, 1914.

[2] TWORT, C. C., and CRAIG, T.: "The Pathogenicity of Johne's Bacillus compared with that of Other Acid-fast Bacilli for some of the Laboratory Animals." *Central. f. Bakt.*, 1913, Bd. 68, p. 455.

[3] BESREDKA et JUPILLE, *C. R. Soc. de Biologie*, February 14, 1914.

[4] BANG, O., und ANDERSEN, C. W.: "Einige Untersuchungen über Komplementbindende Antistoffe, &c.," *Central. f. Bakt.*, 1913, Bd. 69, Heft 7.

[5] LEBEDEFF: "Extraction de la zymase par simple macération," *Ann. de l'Institut Pasteur*, 1913.

[6] MARCHOUX: "La lèpre du rat," *La Presse Médicale*, 1914, No. 22.

FURTHER INVESTIGATIONS INTO THE ETIOLOGY OF WORM NESTS IN CATTLE. DUE TO *ONCOCERCA GIBSONI*. By J. BURTON CLELAND, M.D., CH.M.

[Abstracted by A. W. N. P.]

IN a pamphlet of some 60 pp. Dr. Cleland gives an account of experiments and observations which have been carried out since the 1911 report of the Bureau. The details of this report were published in the veterinary Press at that time on account of the interest taken in worm nests during the inspection of imported meat. Although the present work only deals with the biology of worm nests in cattle, it must be remembered that *Oncocerca* species also occur in man, the horse, and other ruminants. It is therefore likely that experiments and observations which either negate our previous views or add new ones, will be of great value to helminthology in general. The report as now submitted adds considerably to our knowledge of the subject and seems to reduce within a narrow compass the question of the means of conveyance of the disease.

PART I.—GENERAL.

(Abstract). There is a short account of the prevailing view with regard to the transmission of these worms from ox to ox, and it is stated that although the actual conveyer of the disease has not been determined, most of the evidence favours the view that *Stomoxys calcitrans* is the culprit. The more important results that have been obtained may be summarized as follows:—

(1) Various Muscidae as well as mosquitoes can ingest the embryos of *Oncocerca gibsoni* when given access to a freshly-opened nodule.

(2) In the case of *Stomoxys calcitrans* not only can the embryos be ingested but they may remain alive and active and in considerable numbers within the alimentary canal in this insect for a period of three days at least. They have not, however, been detected alive after a longer period.

(3) In the case of *Musca domestica* and *Musca vetustissima*, both common flies, we find that the embryos can be ingested, but that in the few experiments so far conducted they have not been found alive in the alimentary canal of these insects, even twenty-four hours after feeding.

(4) Embryos of *Oncocerca gibsoni* have been found in a small thickened area in the skin of the belly of a calf. This area contained no adult worm, and at the *post-mortem* examination later it was found to be far separated from any worm nodules. Probably quite twenty or thirty embryos were present in this small area. By teasing a fresh preparation they were found alive and at various depths below the surface epithelium, sometimes in a fibrous stroma, sometimes near the root sheaths of hairs. In this situation they were often intricately curled, though sometimes they were in looser loops. Their depth below the surface was in many instances much less than the length of the proboscis of *Stomoxys calcitrans*.

(5) Another similar area in front of the shoulder of a cow was pricked and in the exuding juice an embryo worm was detected.

(6) A calf, which had been born on the island, was later killed, and most of the worm nests were found in a state of degeneration. One or two, however, still contained living embryos. A single embryo was detected in the subcutaneous tissue of the front of the left foreleg by means of a smear made at the *post-mortem* examination.

(7) Two bulls, which were under experiment at Milson Island, both showed at the *post-mortem* examination numerous worm nodules. In one case these were exceedingly numerous, amounting to at least 135. The nodules were all comparatively small and only a few were degenerated. They contained, in the several instances in which they were examined in a fresh state, active embryos. These animals came from parts of the State in

which worm nests are not considered to be present or, at least, prevalent. Their duration at Milson Island was in each case a little longer than a year. Everything points to their having been thus heavily infected at Milson Island itself. The distribution of these animals on the island, moreover, supports the view that infection had taken place by means of a biting and flying insect.

(8) In one of these bulls a number of embryos were found in smears made from various cutaneous situations. In the other, embryos were found in one subcutaneous situation (the brisket). In a calf, an embryo was found in a smear from the front of the right shoulder. In a cow, an embryo was found in the subcutaneous tissues of the left fore fetlock, and another in a similar situation from the outer aspect of the right stifle. It will thus be seen that in no less than six animals embryos were met with in subcutaneous situations apart from worm nests, in two instances during life, in five instances (out of seven animals in which particular search was made) at the *post mortem*.

(9) An *Oncocera* about 9 in. long was found in the loose tissues of the back part of the knee-joint in a bull. This worm was not encapsuled though a small fibrous nodule was attached to part of it.

(10) In one instance a group of two female worms containing living embryos and two males was found loosely coiled near the hip joint. These worms were not surrounded by any increase of fibrous tissue, but portion of another was found embedded in a small lymphatic gland.

(11) The portion of a worm embedded in the small gland showed a diameter unquestionably less than the smallest part of an adult male removed from its neighbourhood. This indicates that this particular worm was less developed than its free neighbours. That it had been in this situation in the lymph gland for some considerable time is evidenced by the presence of giant cells surrounding it. It may be thrown out as a suggestion worth further consideration, that perhaps an early stage of the worm is passed in the lymphatic glands, the embryos reaching these soon after inoculation to the bovine host. After developing to a certain extent the worm may then escape and develop further whilst wandering through the tissues, this particular worm found in sections of the lymph gland being considered as having undergone a pathological arrest. An interesting series of speculations

are raised by this finding when we consider the relationship of *Filaria bancrofti* of man to the lymphatic glands of the groin and other areas, and the occurrence of elephantiasis.

SUGGESTED LIFE HISTORY OF *Oncocerca gibsoni*.

From the data accumulated, more especially the recent findings mentioned later in this paper, the following seems to me to be the probable life history of *Oncocerca gibsoni*.

By means of a biting insect, either *Stomoxys calcitrans* or *Culicella vigilar*, embryos are ingested from the bovine host. In the insect a certain stage of development takes place, and eventually the partly developed worm or worms are injected into the subcutaneous tissue of the new bovine host. Having reached the subcutaneous tissue, the young worms start on the migrations, and incidentally increase in size. Probably their own active movements combined with the muscular contractions of the host and the onward flow of lymph, determine a progressively upward movement from the lower parts of the limbs (if there injected) towards the body. Thus, if the worms were injected into the lower parts of the hind legs, they would tend to work upwards past the stifles and round the side of the body towards the front of the belly. Here they could pass under the various muscular planes, which would account for their presence beneath or between the oblique muscles and the muscular masses entering the brisket. From the fore limbs they might similarly reach the brisket area. That the worms are intended to migrate through the tissues, and that such migration is of value in the perpetuation of the species, is, I think, evidenced by the spiral rings which pass round the body, and which are obviously of assistance in preventing the animal, after it has moved forward, from being forced back again. When for some reason or other the adult worm gets arrested—and probably during its wanderings it is more likely to be arrested in some situations, for example, the brisket, than in others—then the embryos which still continue to be liberated produce a reaction in the surrounding tissues, so that eventually the worm becomes encapsuled in a dense fibrous mass which increases in size as time goes on. The embryos themselves may appear in the tissues in one or two ways, either having been deposited during the migrations of encapsuled worms or after having escaped from a developing worm nest before its capsule

has become too dense. In the former instance the young worms may be deposited in situations where biting insects have easy access to them, whilst in the other the active movements of the embryos would probably eventually lead to a certain number of them occupying suitable positions for ingestion by insect hosts. It is possible that even in an early stage the slight difference in size noted represents the difference in sex. The life cycle would be completed by the ingestion of these embryos from the subcutaneous tissues by the intermediate host, and it is probable, if migrating worms are the source of most of the embryos in the skin, that several embryos might frequently be ingested at the one time.

PART II.—SPECIAL INVESTIGATIONS AND EXPERIMENTS.

Detailed accounts are given of experiments with *Stomoxys calcitrans*, to test the length of life of ingested embryos in it, and to infect a calf by means of it. The inoculation and ingestion of the embryos were also tried upon calves. Lice were also experimented with.

PART III.—EXAMINATION OF CATTLE ON MILSON ISLAND,
NATURALLY INFECTED WITH WORM NESTS.

The results of fifteen *post-mortem* examinations are recorded, and tables are given to show the number of worm nests encountered, their size, situation, and condition, together with the presence or absence of active embryos.

A series of photo-micrographs of the worms and embryos *in situ* concludes the work.

TETANUS: ITS PREVENTION AND TREATMENT BY
MEANS OF ANTITETANIC SERUM.*

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TETANUS cannot be said to be of frequent occurrence under ordinary conditions of life in time of peace, but the outbreak of war is often followed by a comparatively large increase in the number of cases of this disease.

* Reproduced by the courtesy of the Editor of the *British Medical Journal*.

These notes, the fruit of work in a serum laboratory and of a slight cultivation of the literature, were gathered together some months ago without any idea of their appearing in their present form, and I now publish them with the object of calling the attention of those who have not specially studied the question to the value of tetanus antitoxin, which is inestimable when the serum is used properly as a prophylactic. It is to be hoped that at the present time systematic use will be made of this remedy, so that one, at any rate, of the hazards run by those who are offering their all on the battlefield in defence of their country may be reduced to a minimum.

HISTORICAL.

Tetanus, or lockjaw, is a malady common to man and many animals. It was recognized in ancient times, and it has long been known that it was likely to follow the soiling of wounds with earth, dust, and similar material. About the middle of the nineteenth century the impression gained ground that it was due to the production of a poison in the wound, and in 1884 Carle and Rattone reported that they had conveyed the disease by means of pus from a case of tetanus.

In 1885 Nicolaier produced tetanus in mice, guinea-pigs, and rabbits by inoculating them with garden soil, and the pus from the wounds carried on the infection from animal to animal. In the local lesion Nicolaier found a bacillus with a spore at the end, but he did not succeed in obtaining a pure culture.

In 1886 Rosenbach found a similar bacillus in a case of human tetanus, but he also was unsuccessful in his attempts to isolate it. Knut Faber (1889) separated the toxin from mixed cultures by means of filtration through porcelain. Kitasato in 1889 was the first who succeeded in securing a pure culture of this bacillus and in proving that it alone was the causal agent of the disease.

DISTRIBUTION OF THE BACILLUS.

The *Bacillus tetani* is widely distributed in nature, being found in the soil of most cultivated areas, in the streets of cities, and, in fact, in any place where there is faecal contamination. v. Lingelsheim recalls the examination by Bossano of samples of dust from thirty-eight towns, only twelve of which were found

free from tetanus bacilli. Nicolaier found it in twelve out of eighteen samples of earth in the neighbourhood of Göttingen.

Choukévitch (1911) demonstrated its presence in the intestinal contents of two horses out of eighteen, but Lukas (1914) was more successful, as he isolated it from the fæces of sixteen out of seventeen horses. Joseph (1910) examined the excreta of cattle, and came to the conclusion that the *B. tetani* must be considered a normal inhabitant of the intestine of these animals. Römer (1909) also found it frequently in the fæces of adult cattle, but it was not usually present in animals under 2 years of age. Further, tetanus antitoxin was found in the blood of the older animals in more than 50 per cent. of the cases examined. Dolly (1910) found tetanus bacilli frequently in the wads of blank cartridges, and Graser (1910) reports a like result. Rabinowitsch (1907) found the spores of this bacillus in the water in which strawberries sold in Berlin had been washed. It is said to have been found in the mud of the Dead Sea.

This wide distribution of the organism emphasizes the necessity for extreme care in cleansing all wounds, but especially those which have come in contact with street dust, road sweepings, the soil of cultivated fields, garden earth, manure, &c.

Bahnson (cited by Anders and Morgan) stated that during the American Civil War he was put with other prisoners into a shelter that had been used for horses, and that all the wounded placed there who did not die as a direct result of their wounds developed tetanus, and all of them died.

CULTIVATION OF THE BACILLUS.

Under the usual conditions of artificial cultivation in pure culture the tetanus bacillus will not grow in the presence of oxygen, and therefore it is termed an "anaerobic" organism. But if some nutrient medium be inoculated with the *B. tetani*, and also with some oxygen-loving organism, such as the *B. subtilis* (hay bacillus), the absence of oxygen is not so necessary, as the *B. subtilis* will use up the oxygen and produce conditions in which the *B. tetani* can grow. Further, Tarozzi and others have shown that if pieces of animal tissue be placed in a liquid culture medium the bacilli will grow alone in the presence of oxygen, the dead tissue acting as a reducing agent.

In nature we get a combination of these two methods of

producing conditions suitable for growth; in the earth we have organic materials to act as reducing agents and the aerobic organisms to use up oxygen; in contused and dirtied wounds we have the dead tissues and the pyogenic cocci to act in a similar manner.

PRODUCTION OF TETANUS TOXIN.

Tetanus toxin is prepared by growing the tetanus bacillus in nutrient bouillon, of neutral or slightly alkaline reaction, which may or may not contain some reducing agent, such as glucose, sodium sulphindigotate, &c. Special flasks filled with such a broth are inoculated with the tetanus bacillus, hydrogen gas is passed through the liquid, and the flasks are placed at 37° C. for eight to ten days, when the bouillon is filtered through porcelain to remove the bacilli and spores. The filtrate forms the tetanus toxin. The toxicity of such a filtrate varies very much. A mouse of 15 grammes weight might be killed in three to four days by $\frac{1}{50000}$ c.c., or it might be necessary to inject $\frac{1}{1000}$ c.c. or even more. The susceptibility of different species of animals to this toxin varies very markedly; thus it is stated that if a certain quantity of toxin will just kill 1 gramme of mouse the same quantity will kill

6 grammes of guinea-pig	$\frac{1}{500}$ gramme of cat
12 „ horse	$\frac{1}{1000}$ „ goose
$\frac{1}{2}$ gramme of goat	$\frac{1}{4000}$ „ pigeon
$\frac{1}{10}$ „ rabbit	$\frac{1}{80000}$ „ hen

from which it is evident that the horse is one of the most susceptible of animals.

PRODUCTION OF TETANUS ANTITOXIN.

In 1890 Behring and Kitasato showed that animals could be immunized against the tetanus bacillus and its toxin, and that then their blood had acquired a new property, so that when it was injected in suitable quantity into other animals these were protected against doses of tetanus which otherwise would be invariably fatal. This new property, they thought, was due to the development in the blood of immunized animals of a substance which, as it neutralized the toxin, they called "antitoxin." When the fluid part of the blood has been separated from the solids it is found that the antitoxin is contained in the plasma or serum. Horses are the animals most frequently used

in the production of tetanus antitoxin for therapeutic purposes. As they are so highly susceptible to the toxin, the utmost care is required during the process of immunization to avoid the occurrence of accidents. Therefore, at the beginning of the immunization the toxin is not given in the pure state, but only after having been modified by chemicals or by being mixed with antitoxin. Sometimes the toxin and the antitoxin are not mixed, but are given simultaneously in separate parts of the body, or the antitoxin is given a few hours before the toxin. Whichever method is used at the commencement the object is always the same, namely, to produce a basal immunity so that after a time the animal will bear without ill-effect the inoculation of pure toxin. Therefore, as the injections are repeated the amount of modifying agent is gradually decreased until only the toxin is given. When the establishment of a basal immunity has been demonstrated the doses are increased more rapidly, and finally 200 c.c., 400 c.c., or 1,000 c.c. of pure toxin are injected at one time. The inoculations are usually given subcutaneously or intramuscularly (though some use the intravenous route) at intervals of five to ten days. After the final dose a rest of one to three weeks is given before the animal is bled, when on an average 8 litres of blood are withdrawn. If considered desirable another bleeding may be taken at the end of a week, and followed by a third, fourth, or fifth at intervals of seven or eight days. The animal then has a rest of three weeks or more before being reimmunized. During a bleeding, as well as during all subsequent processes, every precaution is taken to prevent contamination. When the plasma or serum has been obtained separate from the corpuscles and clot a small amount of preservative is added, and it is put away in a cool dark place for a time.

As soon as possible after a bleeding the serum is tested to ascertain whether it contains enough antitoxin to render it fit for therapeutic use. This standardization is carried out according to the American method introduced by Rosenau and Anderson (1908), a description of which has been published in *Bulletin No. 43* of the United States Public Health and Marine Hospital Service and in the *Journal of Hygiene*, January, 1914.*

* The Lister Institute serum is thus standardized.

When required for use the serum is filtered through porcelain and distributed into small bottles. Before being sent out for therapeutic use antitetanic serum is tested:—

(1) *For absence of toxicity* by animal experiment, 10 c.c. of serum being injected subcutaneously into each of two guinea-pigs of 250 grammes weight. The animals must remain well.

(2) *For sterility* by cultural experiment aerobically and anaerobically. The media inoculated with the serum must not show any growth.

(3) *For non-excess of preservative*, 0.5 c.c. of serum being injected subcutaneously into a mouse of 15 grammes weight. The animal must not show more than temporary symptoms of intoxication.

From the time the serum is first obtained its antitoxin content begins to diminish. This diminution takes place most rapidly at first; later the serum appears to reach a condition of comparatively stable equilibrium, when the deterioration proceeds much more slowly. To compensate for this unavoidable loss there is usually put into each bottle an amount of antitoxin in excess of the quantity stated to be present, sufficient to make it probable that the bottle will, at the end of two years, contain the amount of antitoxin stated on the label, provided it is stored in a dark cool place—preferably in an ice-chest.

PROPHYLACTIC USE OF TETANUS ANTITOXIN.

Tetanus antitoxin may be used (1) prophylactically, (2) curatively.

As a prophylactic tetanus antitoxin yields excellent results.

Animal experiment has proved:—

That if a fatal dose of tetanus toxin be mixed together with a suitable amount of tetanus antitoxin, the mixture can be injected into animals without giving rise to any ill-effect whatever.

That the effect of a fatal dose of toxin can be completely inhibited by the injection of antitoxin twenty-four hours previously.

That a fatal result can be prevented by injecting a suitable dose of serum within a short time of the injection of the toxin.

From these results it would naturally be expected that tetanus antitoxin would furnish good results when used as a prophylactic. Such has been the case.

Vaillard (1912, p. 224) refers to the practice of eight veterinary surgeons from 1898 to 1906. In that period they inoculated 13,124 animals after operations or accidental wounds, and not a single case of tetanus occurred among them. During the same time two veterinary surgeons alone saw 139 cases of tetanus among animals which did not receive the treatment. If the figures of Nocard and Labat are added, we get 16,917 animals which had a prophylactic injection, and among them one single horse had tetanus—in this case the antitoxin was given five days after the wound, and the attack was very benign.

Huguier (1909) used to give two injections of 10 c.c. each of antitetanic serum, but for some years has been content to give one, and, although he operated in conditions under which infection was most possible, he has not had one case of tetanus among horses thus treated prophylactically.

Dieudonné (1909) records 1,009 operations for castration or hernia, with no case of tetanus, although only a single injection of serum was given. During the same period he observed 87 cases of tetanus among horses operated on or wounded which had not had a prophylactic injection.

Parker Hitchens (1910) has proved experimentally that a dose of 300 U.S.A. units of tetanus antitoxin will protect a horse against an infection fatal to the control animals.

Mohler and Eichhorn (1911) found experimentally that as regards an infection fatal to the control:—

300 U.S.A. units given forty-eight hours after infection = no symptoms of tetanus.

500 U.S.A. units given seventy-two hours after infection = no symptoms of tetanus.

700 U.S.A. units given ninety-six hours after infection = no symptoms of tetanus.

Whereas—

250 U.S.A. units given forty-eight hours after infection = local tetanus. Recovery.

400 U.S.A. units given ninety-six hours after infection = local tetanus. Recovery.

They conclude "that 500 U.S.A. units is a sufficient dose of antitoxin for use as a prophylactic, even in cases where the infection has occurred four days prior to the injection of antitoxin."

The experience of veterinary surgeons is therefore all in favour of the value of the prophylactic use of antitetanic serum. The results of its use for a similar purpose in the human subject are scarcely less decisive.

Vaillard (1912) cites the experience of Biron and Pied. These surgeons did not use serum from 1895 to 1902, and had during those years eleven cases of tetanus, which were all fatal. In 1903 they began to use serum systematically in every case in which there was a chance of infection with tetanus. From 1903 to 1910 there was not a single case of tetanus in their practice, but during this period they received into their wards four cases of tetanus from outside; three cases of tetanus were taken into other wards of the same hospital, and there were two deaths from tetanus in the town. Vaillard refers also to cases of tetanus following wounds received during the celebrations on July 4 (Independence Day) in America. In 1903 there were 415 cases of tetanus. Then the prophylactic treatment was strongly urged and began to be made use of.

In 1904 there were	...	...	...	105 cases.
In 1905 " "	...	...	...	104 "
In 1906 " "	...	...	...	89 "
In 1907 " "	...	...	...	73 "

These figures suggest that, as the years passed and the beneficial results were recognized, more and more attention was devoted to prophylactic serum treatment.

Confirmatory evidence has also been brought forward by Brandenstein (1908); Bockenheimer (1909); Solieri (1910), thirty-five cases with one death; Graser (1910), no case of tetanus in eight years among patients treated prophylactically; Simon (1913, p. 236), citing Liell's analysis of 350 cases of Fourth of July wounds and tetanus, shows a mortality of 98 per cent.; only seven recovered, and of these five had prophylactic treatment. In 1907 the Editor of the *Journal of the American Medical Association* summed up the case as follows:—

"A fairly careful scrutiny of the American literature for the past five years has not brought to light a single report of the development of tetanus in a person who received a timely prophylactic dose of tetanus antitoxin."

We thus see that the inestimable value of tetanus antitoxin when properly used as a prophylactic is beyond question.

In connection with the words "properly used" in the previous sentence, it is important to remember that antitetanic serum is an antitoxic and not a bactericidal serum. It has no power to inhibit the growth of the bacillus. All antitoxin can do is to neutralize the toxin produced. A certain amount (x) of serum can neutralize a certain amount (y) of toxin and no more. Any further toxin produced can exercise its deleterious effect uninfluenced by the serum. Thus if an animal has been infected by tetanus and has received a prophylactic dose of serum it is protected against the toxin produced until the neutralizing power of the serum has been exhausted. When that stage is reached, then, as Vaillard puts it, if more toxin is elaborated one of three things must happen, either:—

- (1) More antitoxin must be given; or
- (2) The animal must produce its own antitoxin; or
- (3) The animal must become intoxicated.

Further (*cf.* Tarozzi *supra*), the tetanus bacillus can multiply and produce toxin in blood-clots, or in necrotic tissue, especially in the depths of a wound; and as there is some evidence suggesting that a sharp fall may occur in the antitoxin content of the blood about one week after an injection of antitoxin, it is advisable to repeat the injections weekly as long as there is any necrotic tissue in a wound. Again, there may be necrotic tissue in a wound several days old, or a large amount of dirt may be ground into the tissue—for example, run-over cases—and it may be decided to operate and thoroughly clean up such a wound. In this case it is advisable to give a prophylactic dose of antitoxin intramuscularly some hours before the operation, as acute tetanus has occurred within twenty-four hours of such operation, and has in all probability been due to the rapid absorption, by the fresh tissues laid bare by the operation, of a large dose of tetanus toxin which had been elaborated in the necrotic tissue, or was present in the dirt with which the wound was soiled.

Dose.

The amount of serum which should be given at each injection depends entirely upon the number of units in each cubic centimetre of the serum. We have seen above that for the horse, which is the animal most susceptible to tetanus poison, the Americans have experimentally demonstrated the dose to be 300

to 500 U.S.A. units; but in the case of man we have no such evidence. v Behring recommends 10 to 20 units. These units are German units, and one of them is equal to about 40 U.S.A. units. The dose would then be 400 to 800 U.S.A. units.

Vaillard mentions 10 c.c. as the dose for superficial easily cleaned wounds, not grossly soiled: 10 c.c. of the tetanus antitoxin sold by the Pasteur Institute usually contains from 500 to 1,000 U.S.A. units.

Tizzoni considers that 200,000 of his own units is an ordinary prophylactic dose. I have only examined one sample of Tizzoni's serum.* The bottle contained 5 c.c. = 200,000 units Tizzoni = 125 units U.S.A.

Park and Williams (p. 243) say: "It is the custom at many dispensaries in New York City and elsewhere to immunize all Fourth of July wounds by injecting 1,000 units. None of these have ever developed tetanus."

From this last statement we would conclude that 1,000 U.S.A. units is an ample prophylactic dose, as it has always prevented tetanus, and that it is quite possible a smaller dose would answer the purpose. This apparently has been found to be the case by v. Behring, Vaillard, and Tizzoni.

Where there is plenty of serum at the disposal of the surgeon there is no need to take thought about the size of the dose, and the ample dose of 1,000 to 1,500 units may be given with the knowledge that it is better to give too much than too little. But when, as may easily happen during war, there is only a limited amount of serum available, then the question of the smallest protective dose becomes important. This may be put down as about 500 U.S.A. units for a simple uncomplicated case, and as the amount of soiling of the wound and contusion of the tissues increases so should the amount of antitoxin be increased.

The interval of time between the infliction of the injury and the injection of serum also has to be taken into consideration when fixing the dose. Dönitz (1897) showed experimentally in rabbits that if an hour were allowed to elapse between the injection of the toxin and that of the serum it required forty times the neutralizing dose (*in vitro*) of serum to save the life of the animal. Studying the same question recently on guinea-

* Cf. *Journal of Hygiene*, January, 1914.

pigs I found that while $\frac{1}{10}$ U.S.A. unit of antitoxin neutralized 100 minimal lethal doses (M.L.D.) of tetanus toxin *in vitro* it required 1 unit of antitoxin to neutralize 1 M.L.D. when given subcutaneously and simultaneously, but in different parts of the body, but 3 units did not save life when given four hours after the toxin. When the serum was given twenty-four hours after 1 M.L.D. of toxin it required 2,000 units of antitoxin to save life, though even this amount did not prevent the onset of the disease. In these animals 1 M.L.D. almost always caused the appearance of slight signs of tetanus at the end of twenty-four hours after the injection of toxin.

It is obvious, then, that the earlier the prophylactic dose is given the more certain will be its effect in preventing tetanus, the smaller within limits will be the dose, and the smaller the cost of treatment. This last item may seem insignificant, and it is so when it is only a question of the prophylactic use of antitoxin; but it will be found to loom large in the picture when it is necessary to consider the value of tetanus antitoxin from a curative point of view.

CURATIVE USE.

"Premonitory" Symptoms.—In all diseases the earlier treatment is commenced the greater the chances of a favourable result. If we could recognize tetanus in a stage as early as we can diphtheria, it would no doubt be possible to obtain just as good results from serum treatment. But tetanus, unlike diphtheria, has no characteristic lesion which appears early in the attack and gives an indication of the nature of the disease. As it has been aptly put by Dr. C. J. Martin, the diagnostic membrane in diphtheria corresponds to the dirt or other foreign body carrying the infection of tetanus, and so, just as we give diphtheria antitoxin when we see such a membrane, so ought we to give tetanus antitoxin when we see any such infecting material in a wound. When the symptoms of tetanus are distinct it means usually that the disease has made very considerable headway, and has reached that stage which in diphtheria would be looked upon by some as beyond the reach of the beneficial influence of antitoxin.

This explains to some extent the uncertain results which follow the use of antitoxin as a curative agent, and it also raises the question whether there are any "premonitory"

symptoms the presence of which might rouse a suspicion that a case was one of commencing tetanus. A study of some of the literature of tetanus has shown that commencing tetanus has been mistaken for "colds," muscular rheumatism, stiff neck, sore throat, influenza, mumps, &c., and it has even been suggested that many cases which have been diagnosed and treated successfully as cases of the above diseases have in reality been slight attacks of tetanus. With the object of directing attention to what may prove to be "premonitory symptoms," K. Evler (1910) relates thirteen cases of tetanus with two deaths, which came under his personal observation, he himself being one of them. He describes these "premonitory" symptoms as being very varied and changeable.

A day or so after the infection there may be general restlessness, changing suddenly to a desire to rest.

Sleeplessness with distressing dreams, and it may be nightly delirium.

Difficulty in micturition due to spasm of the sphincter vesicæ, which may last from a few minutes to half an hour.

Temporary giddiness, violent headache, excessive yawning.

The facial appearance changes and the patient looks anxious, though there is no risus sardonius yet.

There may be trembling of the tongue, which is put out to one side.

There is often a profuse sweating, and darting pains in various parts may occur.

The patient may have a feeling of chilliness, and there may be some swelling, without redness locally, of the injured member and throbbing of its arteries notwithstanding that the limb is raised.

Slight jerking may follow pressure on the flexor tendons, and these muscles may be noticed to be in a condition of increased irritability.*

If symptoms such as these are present with a history of possible infection with the tetanus bacillus Evler considers that the administration of serum is justified. The later symptoms include:—

Increased flow of saliva.

* This condition of increased irritability of the flexor muscles has been noticed to occur in horses quite early in an attack of tetanus.

Reflex cramps of cesophagus.

Ocular symptoms; for example, nystagmus, strabismus.

Ear trouble, and spasmodic cough.

Tremors and clonic spasms which are not painful and which may not attract attention.

Pain persisting after muscular contraction induced by effort.

Swollen and reddened lymphatics, enlarged glands and tenderness in the infected region.

Evler infected himself during an operation, and early symptoms developed within twenty-four hours. He presented nearly all of the symptoms mentioned. Serotherapy was commenced on the fifth day. Nutrient enemata became necessary on the seventeenth and eighteenth days, but on the nineteenth the teeth could be opened a little and recovery then progressed satisfactorily.

Evler's paper directed my attention to these "premonitory" symptoms, and since reading it I have carefully read through a considerable number of cases of tetanus described in the literature, and I have found that practically all the symptoms mentioned by Evler have been noticed as being present early in the disease. All have not been observed in the same patient, but usually the one or two present have been sufficiently prominent to force themselves upon the notice of the physician, and, if he had read Evler's paper, to remind him that such a disease as tetanus might be before him.

If tetanus be studied from the standpoint of these "premonitory" symptoms there is reason to hope that as our knowledge of them increases so will our power of combating the disease be increased by our intervention earlier in an attack.

Curative Value.

The results following the use of antitoxin as a curative agent have been for the most part unsatisfactory up to the present. The reasons given to account for this are that the disease is usually diagnosed only when it has made considerable progress, and that the toxin is absorbed and travels along paths where it is beyond the influence of antitoxin.

In most cases the tetanus bacilli remain and multiply at the site of infection, and the toxin there produced is absorbed and carried to the central nervous system. As regards the path

by which it travels numerous observers have corroborated the findings of Meyer and Ransom that tetanus toxin is chiefly absorbed from the infected wound along the motor nerves of that region, and passes by direct extension into and through the spinal cord, but it may also pass into the circulation. It is, also, thought that in the nerves the toxin passes along the axis cylinder. Some observers, however, do not agree entirely with these conclusions.

Cernovodeanu and Henri (1907) have stated that if the vessels and muscles of a limb be tied while the nerves remain intact, a large amount of tetanus toxin may be injected without the production of tetanus, and they therefore conclude that, while some toxin is absorbed by the nerves the larger part passes along the lymphatics and blood-vessels.

Field (cited by Park and Williams) is of opinion that the toxin does not pass along the axis cylinder but along the lymphatics of the nerves.

Permin (1912-1913), from a critical analysis of the literature and from the results of a large number of experiments performed by himself, concludes that part of the toxin is taken up by the peripheral muscle nerves of the site of infection and passes along the axis cylinder to the spinal cord, and part passes into the lymph and blood and, gaining the general circulation, may pass directly to the ganglion cells of the cord or indirectly by means of the peripheral nerves.

There is, then, no unanimity of opinion as to the special road taken by the toxin, but what we know is that somehow the toxin passes along the nerves comparatively rapidly, but the amount found in the cerebrospinal fluid is not great—on several occasions 1 to 2 c.c. of this fluid have contained a fatal dose for a mouse but not more toxin than this.

The holding of the opinion that the toxin is absorbed by the nerve endings and passes along the axis cylinder—that is, in a situation which is beyond the reach of antitoxin in the blood—renders the curative treatment of declared tetanus practically hopeless, in the opinion of many clinicians. Antitoxin does not appear to penetrate readily into the substance of the peripheral nerves or of the central nervous system, and therefore all it can do is to neutralize only the toxin which has not been absorbed, or which is in the blood-stream. (After huge doses of antitoxin,

given intravenously, only traces of it can be found in the cerebro-spinal fluid.) So a cure can result from the employment of antitoxin only so long as a fatal dose of toxin has not been absorbed. Many cases are on record, and many experiments which seem to confirm this view.* The experiments of McClintock and Hutchings (1913) will serve to illustrate this point. They took sheep with long tails and inserted into the tip of the tail a splinter of wood which had been infected with tetanus spores free from toxin. The first symptoms of tetanus occurred six to eight days later, when the tail was at once amputated, 20 cm. being removed, and 4,500 U.S.A. units of tetanus antitoxin were given intravenously and repeated daily. Every animal but one died, and the symptoms did not seem to be influenced by the serum. The amount of toxin in the blood, as proved by animal experiment, was at its maximum between the fifth and seventh day—2 c.c. of blood containing a fatal dose for a guinea-pig of 350 grammes weight. No toxin was found in 2 c.c. of the blood twenty-four hours after the injection of serum.

From these results it has been concluded that as amputation of the tail had no effect upon the progress of the disease, and as there was toxin in 2 c.c. of the blood before but not twenty-four hours after the commencement of serum treatment, therefore by the time that the first signs of tetanus appeared a fatal dose of toxin either had been absorbed and fixed, or if not completely fixed was in a situation where the antitoxin could not reach it to prevent complete fixation. This being the case, all that can be expected from serum treatment is the prevention of further absorption of toxin by blocking all the paths leading from the infected area—the nerve routes by injection into the nerves of the region affected and the vascular route by large injections into a vein—and all this merely in the hope that a fatal dose of toxin has not already been absorbed.

It is not certain, however, that these views are correct. They may be based on a false premise, namely, that antitoxin must penetrate into the cell before it can neutralize the toxin attached to the cell.

* NOTE.—For a most excellent review of the literature of this subject, cf. Permin, 1913.

But the recent work of Kraus and Amiradzibi (1910) suggests that, contrary to the usual acceptance, a toxin must pass out of a poisoned cell before it can be neutralized by its antitoxin, as the latter cannot penetrate into the cell; and further, that the rate of diffusion of the toxin out of the cell is accelerated by the presence of antitoxin in the surrounding fluid

Moreover, von Graff and Menschikoff (1912) have shown experimentally that it is possible to extract tetanus toxin from liver cells by means of antitoxin. They allowed the cells to remain in contact with a solution of toxin during one hour at 37° C. Then they removed the cells and washed them free from surrounding toxin. Some of these washed cells were injected into mice and caused tetanus. The remainder were soaked in a solution of tetanus antitoxin for one hour at 37° C., and then removed from the serum, washed free from surrounding antitoxin and injected into mice, which remained quite well. Control experiments showed that while toxin could pass into the cell and be so firmly fixed that several washings would not remove it, serum, on the other hand, could not pass into the cell in any demonstrable quantity. It is justifiable, therefore, to presume that the toxin was extracted from the cells by the surrounding antitoxin, and that it is advisable to have as high a concentration of antitoxin as possible in the fluids surrounding poisoned cells.

This view of the action of the antitoxin gives more encouragement to the physician to persevere vigorously with serum treatment. It emphasizes the advisability of employing very large doses of serum so as to saturate the system with antitoxin, and thus not only neutralize any toxin which may be passing from the focus of infection into the blood, but also to extract toxin from cells into which it has already passed.

Such treatment, suggested by the results of experimental research, is practically identical with that employed by many physicians to-day as the outcome of years of bedside observation.

Ernest E. Irons (1912) analysed 252 cases collected by Anders and Morgan* and classified them. The incubation periods of the fatal and non-fatal cases showed practically the same relation. His figures are —

* *Journ. Amer. Med. Assoc.*, July 29, 1905, p. 314.

					Mortality.
Total number of cases	...	...	254	...	71 per cent.
Cases treated without serum	...	...	142	...	77 „
Cases treated with serum	...	...	112	...	63 „
Cases treated with small amounts of serum	...	...	71	...	70.4 „
Cases treated with large amounts (100 c.c. or more) of serum	...	...	41	...	51.0 „

If we compare the mortality of all the cases treated with serum with that of the cases treated without we must allow that the use of serum brings little if any advantage. But if we compare the mortality in cases treated *with large amounts of serum* with the mortality of the cases treated *without serum*, then the beneficial results following such use of serum become manifest.

W. H. Park (1910) says that when a large intravenous dose is given within a few hours of the onset of the symptoms the effect is marked. More than 50 per cent. of the patients so treated recovered, "some of whom I feel perfectly sure would have died without the serum." At the first sign of actual tetanus 10,000 to 20,000 U.S.A. units should be given intravenously, and followed every twelve hours by further injections. The later injections may be given subcutaneously if the intravenous route becomes difficult. Torres (1912), after an experience of 110 cases of acute tetanus in eight years with a mortality of 32.7 per cent., gives an intravenous injection of 120 c.c. of serum as the rule. He repeats it twice, or even oftener, in the first twenty-four hours if necessary, and then gives 100 c.c. daily if the symptoms are still present.

Penna (1913) also gives injections of 100 c.c. intravenously once or twice in the twenty-four hours, and keeps it up for several days *even though the patient may be improving*.

Van der Bogert (1913) cites:—

(1) Strock (1907), who treated his cases of tetanus during six years with small doses of serum and had a mortality of 100 per cent. Then he treated five cases with very large doses, and the mortality was 20 per cent.

(2) The three cases of Young (1912), which appeared hopeless, but recovered—a boy had 150,000 U.S.A. units, a man had 220,000 U.S.A. units, and a girl aged 14 had 587,000 U.S.A. units.

Many other similar records could be quoted, if space permitted, to show that among those who not infrequently meet with cases

of tetanus the tendency of late years has been to use much larger doses of antitoxin than formerly, and that the use of these large doses seems to be followed by more uniformly beneficial results than were observed in former years when only small doses were employed.

Modes of Administration.

Besides the size of the dose the mode of administration of the serum has an influence upon the result. Serum may be given:—

- (1) Intracerebrally.
- (2) Subarachnoidally.
- (3) Intraneurally.
- (4) Intravenously.
- (5) Intramuscularly.
- (6) Subcutaneously.

(1) Intracerebral injections have given very good results in animals, and in several cases in man also, but the risk of permanent injury to the nervous system has prevented this method coming into general use. Ballance (1914), however, suggests that the introduction of serum into the lateral ventricle might be used in tetanus, as he thinks that with reasonable care the operation as a whole is free from danger.

(3) Intraneural injections were strongly recommended by Rogers (1905), but they are not free from risk, and are seldom used.

(4, 5 and 6) As regards the intravenous, intramuscular, and subcutaneous route the final result is the same in all three. The only difference is in the time taken for the antitoxin to be absorbed and distributed throughout the body. In the case of the intravenous method it is a question of a few minutes; of the intramuscular, of a few hours; while after subcutaneous injections it is one to two days before the maximum concentration of antitoxin in the blood is reached.

There remains the subarachnoidal route to consider.

Descos and Barthélemy (1902) experimentally showed that intraspinal injections gave the best result.

Von Graff (1912) carried out a number of experiments in the Serotherapeutic Institute in Vienna, and came to the conclusion that this route was the most effective, and that next to it came the intravenous.

Permin (*loc. cit.*) considers that intraspinal are just as good as intraneural, and are better than intravenous, inoculations.

W. H. Park (1914, personal communication) has treated six successive cases of tetanus by intraspinal injections, and all have recovered.

Hofman (1907) states that of thirteen cases which had serum beneath the skin 53·8 per cent. died, whereas of sixteen cases which had serum subdurally only 12·5 per cent. died, and these sixteen cases included a number of extremely severe cases with brief incubation periods. He recommends that the intraspinal injections should be given every two to three days and the subcutaneous daily. Graser (1910) also advises serum by intralumbar injection every two to three days and daily beneath the skin. Gobiet (1904), Neugebauer (1905), Jerie (1908), and Buffagni (1910) and others speak of the good effect of intraspinal injections of antitoxin, and Buffagni says:—

(1) After the first injection one observes an increase in the symptoms, reaching a maximum in forty-five hours, and then passing off and giving place to improvement.

(2) The organization of the patient reacts to each injection of tetanus antitoxin by a rise in temperature of 1·5° to 2° C., which passes off in ten to twelve hours.

(3) After each injection more or less distinct improvement of all conditions occurs, and especially of the tetanic attacks.*

The method of procedure in the serum treatment of a case of tetanus would then be somewhat as follows:—

(1) The injection beneath the arachnoid, or in very severe cases even (Ballance, 1914) into the lateral ventricle, of as large a dose of antitoxin as may be conveniently given—for example, 3,000 to 8,000 U.S.A. units.

(2) The injection into a vein of a large dose—9,000 to 16,000 U.S.A. units—with the object of flooding the system with antitoxin as soon as possible.

(3) The injection of antitoxin intramuscularly; and

(4) The repeated injection of antitoxin subcutaneously—both with a view of keeping up the concentration in the blood.

Clinical experience, both in man and horse, has shown that it is absolutely necessary to continue the injections, even though improvement has apparently set in, as otherwise the symptoms are

* These observations of Buffagni are very like those made by some physicians with regard to intraspinal injections of antimeningococcic serum.

very liable to return—in some cases with greater intensity than at first.

“ IDIOPATHIC ” TETANUS.

The absence of any history of injury sometimes makes the diagnosis of tetanus at first very difficult. In the past such cases were classed as rheumatic or idiopathic tetanus, but we know now that for tetanus to declare itself the tetanus bacillus must somehow have gained entry into the body.

It has been shown experimentally that tetanus spores free from toxin or foreign material may be injected into animals without causing tetanus, and that they can become disseminated in the body and remain latent for a time. Then if suitable conditions arise, such as the formation of a necrotic area in the tissues, such latent spores may germinate and give rise to tetanus.

Canfora (1907) infected animals subcutaneously with tetanus bacilli and found that they spread all over the body. He also injected toxin-free tetanus spores, and found them in the blood twelve hours later. They may remain in the blood for ten to fifteen days, during which time very slight injuries are sufficient to set up tetanus. Later the spores become localized in the liver, spleen, lungs, kidneys, lymph glands and marrow, where they may remain latent for some months.

Semple (1911) came to the conclusion that an injection of a solution of quinine might cause enough destruction of tissue to produce conditions favourable for the germination of spores.

It behoves us, therefore, to bear tetanus in mind, even though there be no history of injury, whenever we meet with symptoms similar to the premonitory symptoms mentioned by Evler and found to be present in so many cases of this disease.

PRESERVATIVES IN SERUM.

Most serums have a small amount of preservative (phenol, trikresol, chloroform) added to them, and when doses such as 120 c.c. are given at one time, the presence of preservatives requires consideration and raises the question as to how much preservative can be given without ill-effect.

Baccelli (1911), who strongly recommends that tetanus should be treated with subcutaneous injections of carbolic acid, states that not less than 1 gramme should be given daily; J. H. Haberlin

(1913) in a case of hydrophobia gave $22\frac{1}{2}$ gr. of phenol subcutaneously in twelve hours without any evidence, either locally or generally, of any deleterious effects; Natoli (1899) injected 5.25 grammes of phenol subcutaneously in eighteen days; and Ascoli (1898) gave 75 c.c. of a 3 per cent. solution without any subsequent toxic symptoms.

The probability of ill-effects being due to the preservation in serum when administered intrathecally has been fully discussed and negated by Flexner in the case of automeningococcic serum. It may, then, be safely assumed that the amount of phenol put into serum is not likely to have any serious consequences.

CONCLUSIONS.

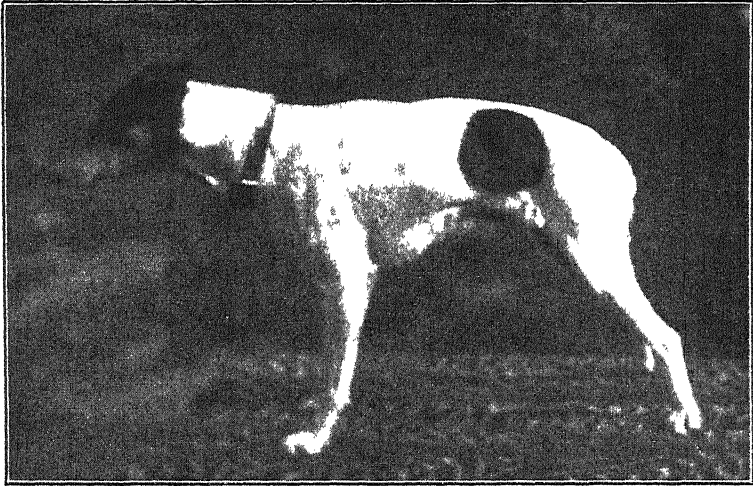
Tetanus may be cured by the administration of antitoxin, provided that the serum treatment is begun early in the attack and is pursued vigorously and continuously. Unfortunately, in the present state of our knowledge a diagnosis is as a rule made only when the disease is in a stage so advanced as to make the results of treatment uncertain, even though very large doses of antitoxin are used. These large doses are costly, and place the serum treatment of tetanus practically out of the reach of those with shallow purses—unless, of course, the serum be provided by the State. But in the prophylactic use of serum there is within the reach of everyone a means of checking the disease. It has been proved beyond the shadow of a doubt that wherever the prophylactic use of antitoxin has been carried out systematically tetanus may be said to have disappeared. Tetanus should therefore be looked upon as a preventible disease, and, when one realizes this, there flashes across the mind the memorable question, "If preventible, why not prevented?"

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Clinical Article.



A Case of Tetanus in a Dog

[This photograph should have been inserted in the Clinical Article by Mr T M Inglis, M R C V S, of Forfar, on p 518 of the October issue]

SUBCUTANEOUS TUBERCULOSIS IN A COW

By CH PLRARD

Public Health Veterinary Surgeon of Seine

On examining a Normandy cow 15 years old, discarded from a dairy and affected with pulmonary tuberculosis, some changes were noted at the level of the middle region of the left side of the neck

These lesions, which consisted of small irregularly bosselated tumours from the size of a grain of millet seed to that of a lentil, isolated or aggregated in small groups, were situated in the subcutaneous connective tissue in the thickness of which they formed a plastron of about 15 cm. in diameter and $\frac{1}{2}$ cm to 1 cm in thickness

Some of them were adherent to the internal face of the skin, others to the external face of the superficial muscles, as is evident from the fact that a large number of them have been divided by the

butcher's knife during the operation of skinning. On section they were of yellow colour and fibrous consistence ; a certain number of them showed commencing calcification. The neighbouring lymphatic ganglions showed no sign of tuberculosis. These subcutaneous lesions were quite different from those already recorded by Ramon and myself, which resemble, to a certain extent, those seen by Darier and Roussy.

They are not to be compared : in one case nodules round or oval surrounded by a fibrous shell of the size of a filbert nut, of elastic consistence, and composed of a homogeneous substance of greyish tint ; in the other, little hard tumours, bosselated, fibrous or partially calcified, and of a beautiful yellow colour. The fact that the cadaver presented besides unequivocal signs of tuberculosis made these subcutaneous alterations particularly suspicious ; attempts to find the tubercle bacillus failed. Two guinea-pigs inoculated subcutaneously with the crushed product of these lesions died in fifty-three and fifty-eight days ; the autopsy showed that they had succumbed to tuberculous infection.

It is curious to note that on sale of the animal, the purchaser some months previously had tested her with tuberculin on the left side of the neck. Was there any connection between this injection and the lesions found in this region at the autopsy ?—*L'Hygiène de la Viande et du Lait*.

VICTORIA VETERINARY BENEVOLENT FUND.

THE quarterly meeting of the Council of the Victoria Veterinary Benevolent Fund was held at 10, Red Lion Square, London, on Thursday, October 8, 1914. There were present : Mr. S. H. Slocock (in the chair), Sir John M'Fadyean, Sir Stewart Stockman; Messrs. F. H. Gooch, Walter Burt, W. Freeman Barrett, S. Villar, H. A. MacCormack, G. A. Banham, N. Almond, R. C. Trigger, Professor Wooldridge, and W. Shipley (Hon. Secretary).

Letters of apology were received from Messrs. J. Dunstan, F. Hobday, P. J. Simpson, and E. Alfred West.

The minutes of the previous meeting having been confirmed, the Secretary presented his quarterly report.

The SECRETARY (Mr. William Shipley) said : " It is important that I should present an interim report on our financial position.

At present we have overspent our income by £17 7s. 3d., having a debit balance at the bank of £11 14s. 4d. We have to meet liabilities in grants already agreed to, to Christmas next, the sum of £75 18s. I anticipate a further expenditure of £30 for passages and outstanding accounts, and one is well aware that it is a practical impossibility to realize any securities for some time to meet these commitments. As against this we have outstanding subscriptions and possible renewals of donations, as per last year, the sum of £54, many, of course, which have not been paid owing to the fact that many helpers are engaged on military duties, and others have had their incomes temporarily reduced owing to the war. I estimate the income from these sources will not produce more than £27. This is a generous estimate. I sincerely hope that every endeavour will be made to induce those members of the profession who are following the even tenor of their way to step in and fill the gap. Our income from investments will be £32 16s. This will leave us with a deficit of £63 9s. 3d. at the end of the year. Of course, I would advise you to bear in mind that the probability of further applications for help must arise, and it will occur to us all that we should be prepared to meet this distress most liberally. Let the members of the profession who are leaving their homes and country for the defence of what is right and just feel that their brother practitioners are doing their best for the little ones left behind. I apprehend a serious financial condition soon or at the end of the year—a reduced subscription list and increased appeal for help.”

The grants to the old recipients were considered fully. On the proposition of Mr. N. ALMOND, seconded by Mr. H. A. MACCORMACK, it was decided to pay arrears in grants to Mrs. M. C. Timms, and continue the same until some more definite evidence has been obtained.

It was decided that no further action could be taken in re-considering the grant to Miss Worsley unless further evidence can be produced.

After a long consideration of the application of Mrs. Farr, of Cullompton, Devon, it was proposed by Sir JOHN M’FADYEAN, and seconded by Mr. GOOCH, that temporary assistance be given at the rate of 10s. per week, instructions being given to the Secretary to make every endeavour to take some action with the

view of getting the two children elected to some charitable school. Failing any such institutions in the West of England, endeavours should be made to obtain the election of these children into the London Orphan Asylum.

Serious consideration was given to the financial report and expressions that every effort should be made to induce new members to take the place of those engaged on military duties and to make provision for any further cases which might occur before the end of the financial year.

A vote of thanks to the Chairman concluded the business of the meeting.

Translation.

SUCCESSFUL CAMPAIGN AGAINST THE GADFLY PLAGUE OF CATTLE.

TOWARDS the end of February the gadfly plague makes itself evident by reason of the appearance of the lumps on the backs of cattle in which the larvæ of the fly are situated. Not merely do the skins of the animals suffer, but the milk-giving capacity of the cows declines. According to the statistics of the Committee for the Suppression of the Plague in Berlin the loss of value in the skin of an affected beast is 4 to 5 marks, and since one-fourth of the dressed hides in Germany is injured by larvæ holes the yearly loss on the total number of skins is from four to five million marks.

In Denmark in isolated instances it has been noticed that, after pressing out of the warbles, cows have given five litres more milk daily than previously. Although milking cows are not so numerously affected with warbles as other cattle, yet the loss in milk-giving capacity of cows that are warbled must amount in Germany to many million marks. We are not powerless against the complaint. By a planned campaign whole districts, if not entirely freed from the trouble, may be rendered almost free from it.

This annihilation of the plague has been the object of "the Committee for the Campaign against the Gadfly in Berlin." Investigations into the life conditions of the fly, and the transference of its eggs to cattle, have made great advance and have given much impulse to the fight against the scourge. At the last sitting of the Committee Dr. Gläser gave an account of his experiments in the year 1913. A test with ten heifers of equal age, all affected with warbles, showed that five of them, after being freed from the larvæ, gained 34 lb. more in weight in a given period than the other five that were left alone. This corresponds at to-day's price to a difference of 15 to 16 marks per head in favour of the warble-free animals. The great warble-killing trials in the circle of Neuhaus which the Committee conducted led to the destruction of 46,231 larvæ. The cost amounted to 419.33 marks and each removed larva cost

0.906 pfennigs for removal. In one district an expert worker in 83½ hours' work removed 12,253 larvæ at a cost of 0.40 marks. If one estimates the injury per cow from the above figures at 15 to 16 marks during May to October, then one can only urgently advise cattle owners to have their animals treated.

The freeing of the animals from warbles commences by ridding all the cattle in the cowhouse or shed from all accessible larvæ. In the German leaflet the following procedure is advocated: The larvæ in the largest lumps are endeavoured to be got rid of by pressure with the fingers. If this, on account of insufficient development of the parasite, does not succeed it is recommended to introduce a strong needle into the small opening in the skin and to impale the larva whose black hind end may generally be seen just behind the aperture; the contents of the larva then runs away. By powerful pressure of the fingers one now seeks to empty the warble lump. The irremovable impaled larva dies and gradually sloughs away. Injury to the health of the cow is not to be feared. Whilst at pasture an examination of the cows must be made at intervals of fourteen days. By so doing larvæ developing later on may be removed as heretofore. Larvæ removed on meadow land must be destroyed. Killing the larvæ by smearing, previous to driving the cattle out, has been tried. Very good success has been achieved by the use of birch tar oil, of which a kilogram only costs 75 pfennigs. These experiments are being continued this spring.—G. M.—*Oesterreichische Woch. für Tierheilkunde.*

Reviews.

The Agricultural Journal of the Union of South Africa, August, 1914. Edited by H. J. Choles, F.S.S. Issued by the Agricultural Department. Published at Pretoria.

The Editor calls attention to the importance of the insurance of live stock, and announces the founding of the Farmers' Horse and Mule Insurance Association. He discusses pig insurance as practised in England and Wales, and advocates similar measures with farm live stock in South Africa.

Mr. H. W. Taylor has an interesting and valuable article on "Cotton: How to Make it of Economic Importance to South Africa." Several of the illustrations to his paper show the operations of the Rustenburg Tobacco and Cotton Experimental Station, and apparently the growing of cotton might be profitably carried on in selected regions of South Africa. An estimate given by Mr. Taylor is that out of a world population of 1,500,000,000, about 500,000,000 regularly wear clothes, 750,000,000 are partially clothed, and 250,000,000 go naked. At the present time the world's production of cotton is about 20,000,000 bales, or about one-half enough to clothe the population of the entire globe. New and productive cotton-growing areas are necessary, and the claims of South Africa need consideration.

Mr. D. Hutcheon, M.R.C.V.S., writes on "Lung Sickness in Cattle" and "Bots or Paapjes." In reference to the preventive treatment for the latter, Mr. Hutcheon mentions dressing the skin to keep off the flies and removal of the eggs by frequent careful grooming. The singeing or painter's lamp is a quicker and more effective way of removing the eggs than careful grooming, but in many parts of South Africa perhaps this lamp is unknown.

Mr. Reinecke, B.A., deals instructively with "Lime and the Liming of Land."

The journal concludes with rural notes, the new scab regulations, and correspondence. The periodical must be doing excellent work among the agricultural community, and the farmer who reads will find in it a real friend. G. M.

The Rhodesia Agricultural Journal, June, 1914. Edited by the Director of Agriculture, assisted by the Staff of the Agricultural Department. Published bi-monthly. Price 5s. per annum. Printed by the Argus Printing and Publishing Company, Ltd., Salisbury, Rhodesia.

This well got up and clearly printed periodical touches on all matters of importance and interest to Rhodesian agriculturists and colonists. Mention is made of the record crop of tobacco that has been grown in the State, amounting approximately to 2,240,000 lb. A new society, called the Rhodesian Tobacco Planters' Co-operative Society has been formed to further the growth of the plant, and it is hoped that buyers will eventually come forward in goodly numbers to take up the supply and encourage the industry.

The first maize-reaper and binder has been at work in the country. It was drawn by six oxen and did its work satisfactorily.

Friesland cattle and merino sheep, which both appear to do well in the colony, have been procured from Germany. There are 370 tanks in existence in the country for dipping cattle as a preventive of infection from tick-borne diseases. The demand for these commodities is still great, and no other single preventive measure can compare with this precaution against many ailments.

Mr. R. McIlwaine, M.A., LL.B., has an instructive article on citrus-growing. His experiments have chiefly been conducted with oranges, tangerines and grape-fruit, and he writes that he is "quite satisfied that the country is exceptionally fitted for citrus-growing." An export trade must be built up, and, as the trees require unremitting attention, "ten trees well looked after are more profitable than one hundred neglected."

Mr. B. Rosenthal writes on "How to Cure Hides and Skins," and his directions are short and concise. The *hides* of cows and oxen are either salted or wind-dried, but wind-drying cannot be used to cure the *skins* of sheep and goats.

Mr. L. E. W. Bevan, M.R.C.V.S., has a "Note on the Treatment of Biliary Fever of the Horse with Trypan Blue." He comes to the conclusion that the drug is useless in the complaint. Chief Veterinary Surgeon J. M. Sinclair furnishes veterinary reports for March and April, from which it would seem that not much coast fever is rife in

the districts at present, and all imported horses, mules and donkeys that were tested with mallein were found free from glanders. Veterinary lectures are delivered to farmers, and many useful bulletins on agriculture, crops, entomology, veterinary matters, &c., may be obtained free of charge from the Department of Agriculture. The periodical is well illustrated and a credit to the compilers and printers.

G. M.

Disinfectants and Disinfection. By Walter Jowett, F.R.C.V.S., D.V.H. (Veterinary Division), Department of Agriculture, Cape Town. Government Printing and Stationery Office, Pretoria.

This is a reprint in pamphlet form from the *Agricultural Journal of the Union of South Africa*, intended to enlighten animal owners with respect to disinfectants and disinfection in regard to the buildings and objects of contact rendered infective by animals suffering from dangerous communicable diseases. Cremation is discussed and Major-General Smith's device for incinerating carcasses described.

Physical means of disinfection comprise burning, moist heat and steam. Chemical disinfectants include gaseous agents such as sulphur dioxide gas, chlorine, and formaldehyde. The chemical solutions recommended by the author are phenol, crude carbolic acid, cresol, corrosive sublimate, formalin, and chlorinated lime. Routine disinfection, disinfection of hides and skins, disinfection of attendants, and methods of preparing whitewash conclude the pamphlet. There is no doubt that there is great need of putting a plain system of disinfection before animal owners and attendants, and, doubtless, Mr. Jowett has done excellent service by getting his paper circulated in pamphlet form. Headwork is needed in the case of effective disinfection not less than in the more intricate problem of the therapy of disease. There is much ignorance rampant as to what constitutes thorough disinfection, and a plentiful sprinkling of germicides or an abundant swilling with liquid disinfectants may mean zeal, but unless done intelligently is only misapplied effort. Probably there is a greater need for education in South Africa on the subject of Mr. Jowett's pamphlet than there is here, but knowing men recognize the great necessity there is for enlightenment of the laity on this subject here. Mr. Jowett's pamphlet cannot help but be one of the most useful ever issued by the Department of Agriculture of South Africa.

G. M.

Eighteenth Annual Report of the New York Zoological Society chartered in 1895. Objects of the Society: A Public Zoological Park; the Preservation of Native Animals and the Promotion of Zoology. 1913. Office of the Society, 11, Wall Street, New York. Printed by Clark and Fritts, 209, West 38th Street, New York.

This is an enlightening record of reports of the various departments of animal life in the New York Zoo. There are twelve full-page illustrations in the work, all being excellently produced, and perhaps the most interesting being those of the landing and shipment of

porpoises from Cape Hatteras to the Aquarium of the Zoo. Two attempts were made to obtain live porpoises for the large central pool of the Aquarium. The first consignment died during and after transference by reason of being forwarded dry to their destination. The second lot were put in tanks with water at the temperature of that of Cape Hatteras, and they are now doing well in the large pool of the gardens which is 7 ft. deep and 37 ft. in diameter. They are the only porpoises in captivity, and within recent months they have given evidence that they will breed in such quarters. The Report of the Veterinarian and Pathologist to the Society, Mr. W. Reid Blair, D.V.S., shows that tuberculosis has chiefly been confined to the primates, and that the type is always human, whilst that of the carnivores is of the bovine type. Gastro-enteritis affected a good many of the hoofed animals, and was due to irritating substances in clover and alfalfa. Mouldy hay and grain causing fungi poisoning chiefly in deer were responsible for several deaths. Pneumonia affected both primates and small mammals, and parasitic diseases and rickets were both in evidence. An unusually large number of animals met violent deaths as a result of fighting with cage or corral mates.

The finance and membership of the Society seem to be in a flourishing state, and that the place is appreciated is shown by the fact that in 1913 there was an increase of nearly a quarter of a million in the attendance of the public and that the record figure of 1,943,683 persons was reached.

We are indebted for the Report to Mr. Gilbert Congdon Wood, one of the Members of the Society, and we take the opportunity of thanking him for it here.

G. M.

Lehrbuch der Topographischen Anatomie des Pferdes (Text-book of the Topographical Anatomy of the Horse). By W. Ellenberger, M.D., Ph.D. and D.V.M., and H. Baum, Ph.D., Professors at the Dresden Veterinary College. Price 22 marks. Two hundred and fifteen figs. in the text, many of which are coloured. Pp. 427. 1914. Publishers: Paul Parey, Hedemannstrasse, Berlin.

This text-book has been brought out chiefly for the use of students and to replace in shorter and handier form a three-volume work issued on the same subject in 1897. The text of the bulkier volumes has been considerably shortened, but the number of the illustrations remains the same.

The anatomical relationship of different structures in the horse's body is lucidly described and illustrated, and to the surgeon and anatomist the work will be very helpful. From college teaching one is apt to look on the various tissues as distinct and apart from each other and to forget the intimate relationship between them and the interdependence of each on all and all on each. It is in books like the one under review that these isolated views get corrected and remedied, and the everyday routine of practice soon makes one grateful for a good anatomical text-book showing the relationship of varied parts. The various regions of the body, such

as head, neck, thorax, abdomen, &c., are taken in order, and every tissue of which they are composed, from the largest to the most minute, comes under review. The illustrations are a strong feature of the work and are admirable in every respect, and the method of executing the drawings of different tissues, so that each may be recognized distinctly by the student at a glance, is very commendable.

The work is bound and printed in the best Paul Parey style, and we feel sure that it will circulate far beyond its place of origin in Germany.

We have no book exactly like it in this country, and any author who intends producing such a handy work here cannot do better than take Ellenberger and Baum's volume as his model. G. M.

Annual Report of the Bengal Veterinary College and of the Civil Veterinary Department, Bengal, for the year 1912-13.

Published by the Bengal Secretarial Book Depot. 1913.
Price 9d.

Major A. Smith reports that when he took over formal charge of the Bengal Veterinary College on June 4 there were 107 students in the three classes A, B, and C. At the examinations in March 72 students passed, and 22 of these received their diplomas. 2,428 patients were treated at the College during the year. A new hospital for dogs has been erected, and some of the College buildings have been improved. Twenty-nine horses were tested for glanders in the Contagious Diseases Hospital, 5 were destroyed for glanders, 1 died of the disease, 21 were discharged as free, and 1 remained under observation. Rinderpest, foot-and-mouth disease and tuberculosis were dealt with by the Department. The Raymond Research Laboratory did useful work during the year in the investigation of the prevalent specific diseases. The British Commission on Foot-and-Mouth Disease was supplied with a large amount of material for its work by the laboratory.

Mr. P. J. Kerr, M.R.C.V.S., Superintendent of the Civil Veterinary Department in Bengal, furnishes his Annual Report. As in the case of many veterinary surgeons working for the Government in India, he seems to have had an immense amount of work to do. During a period of five months he travelled 5,733 miles by rail, 907 by steamer, and 279 by road. He inspected many farms and districts, provisionally selected seven sites for Dacca New Veterinary Hospital, and attended two outbreaks of glanders. An inspector from the Department was trained at the Bengal College, and three reserve veterinary assistants also attended courses.

Of the fifty-five assistants employed by the Department, eighteen were stationary and thirty-five itinerant. They all worked fairly well, but showed lack of keenness. Cattle poisoning is common in the district, and it seems almost impossible to detect the culprits. The establishment of a cattle farm is urgently needed in the district, the people knowing literally nothing about breeding. Small demonstration farms might help to eradicate the native indifference in this matter. There is great need for a second

European Superintendent in the province, the present Superintendent being much overworked, and additional veterinary assistants are required and could all be fully and usefully employed. Lack of funds, however, militates against progress. Foot-and-mouth disease, rinderpest, hæmorrhagic septicæmia, and anthrax were the chief diseases investigated by the Department, and protective inoculation was followed by immunity in nearly all cases. Science is evidently improving animal matters in Bengal, but the co-operation of the officers of other Government departments and of the inhabitants generally is needed to bring about a greater measure of success. G. M.

ITEMS OF WAR NEWS.

It is pleasing to the profession to read of the recognition in dispatches of some of its members, and we congratulate most heartily the following officers whose names were mentioned by General French in his report: Captain W. I. Macauley, Captain Oliver, Captain F. W. Pawlett (T.F.), Lieut.-Colonel W. D. Smith, Captain E. J. Wadley.

An extract, too, from a letter sent by Lieutenant T. Davies, M.R.C.V.S., to a friend in England shows that the veterinary officer sometimes comes in for a very warm time, as, indeed, has already been shown by the deaths of those whose names have already been added to the "Roll of Honour" of men who have given their lives for their country:—

"As — is now pretty old war news I may mention a little about it.

"It was on September 1, and we were billeted in the village. About 5.30 a.m. the Germans attacked with 15 guns, maxim guns and rifles in great force, at close range. We were off saddle, and Colonel Ansell and I were having breakfast in a farm. We all ran to the horses and saddled up amidst a hail of bullets and shells, and Colonel Ansell took the regiment to a flank, and with other units helped to capture 10 of the guns, kill a lot of Germans, and take about 40 prisoners.

"Colonel Ansell was killed, De Crespigny of the Bays, and nearly all the officers of L Battery R.H.A. were killed or wounded. I had my horse shot under me, but I got off without being touched. It was very exciting."

NOTE.—All communications should be addressed to 8, Henrietta Street Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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THE LATE SIR WALTER GILBEY, BART., D.L., J.P.

THE VETERINARY JOURNAL

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Editorial.

THE COMFORT FUND: ITS OBJECTS AND AIMS.

NEITHER men nor animals, while campaigning, can do the work allotted to them well without being kept fit and in good health. Both will carry out their tasks the better by good treatment and care. The difficulty of accommodating and sheltering quickly large bodies of men, the discomfort of inclement weather, the danger to health of fighting knee or waist deep in water, the eye that must ever be on the watch for the enemy, and the arm ever ready to strike—all these things, if to be done, suffered, or kept effective, will be so much the better accomplished if means are at hand to stave off the strain of their worst features, soften their roughnesses, and aid in keeping natural keenness at concert pitch. Soldiers wounded in doing their duty will doubly appreciate little solaces and comforts.

It is well known to our profession that a fund has been started and organized by Mrs. Moore and other generous-minded ladies connected with the Veterinary profession for the benefit of the Army Veterinary Corps now on service in France.

The objects of the fund are fourfold: (1) To give the officers who command veterinary section hospitals and mobile sections a supply of warm garments and comforts from which they can draw for the benefit of their men; (2) to supply officers with small articles of warm clothing necessary in severe weather and under war conditions—young officers unaccustomed to previous campaigning especially need help in this respect; (3) to supplement and augment what clothing is available from military supply depôts (this stock is often situated at bases far down the lines of communication, and not quickly available or obtainable by men at the front); (4) to supply warm, dry garments that can immediately be given when need arises to replace what is worn out, soaked with wet, or otherwise unfit for use.

There is no doubt that these objects can better be attained and more quickly accomplished by a special fund got up for an individual corps than by a general fund collected and distributed by a large and slowly moving organization and devoted to the needs of the entire Army.

The greatness of the task entered upon in our case may be slightly understood when we state that there are attached to the Army Veterinary Corps now serving in France close on 3,000 officers, non-commissioned officers, and men. There are also a large number of horsekeepers, grooms, shoeing-smiths, &c., who have volunteered for service. The work of the Corps may be partly comprehended when we set down that it acts at several base hospitals, and includes that of the operations of a dozen mobile veterinary sections which ply between the actual battlefield and the section hospital succouring and conveying the wounded animals.

Over 30,000 animals have already been treated at the hospitals and of these about 10,000 are now convalescent. Truly a noble work on behalf of creatures that have patiently and effectively performed their specified tasks in the service of their country. It is the duty of those of us who remain at home and carry on our work in safety to see that the Comfort Fund keeps strong and plentiful enough to aid and solace our brothers of the Expeditionary Force. As long as the war lasts it will be necessary to keep it going, and second contributions, or even third or fourth ones, will perhaps be required, and if needed will certainly be welcomed. Special attention may be drawn here to the fact that Christmas time is not far off, when the vacant chair will be especially noted, and the absent one be thinking of those dear to him at home. At such a time our comrades round the camp fires will be cheered and brightened by a good supply of creature comforts; they will rejoice that they are in a measure able to enjoy a remembrance from home of the festive season. Let us see that the souvenir is one of full and material benefit and that the kind organizers of the scheme are well supplied with the wherewithal to gladden their hearts.

Briefly, for space is limited, we would also call attention to the fact that the promoters of the fund desire to help and keep in touch with the wives and families of the men of the Corps, and at Christmas time are sending to each "wife" a Christmas hamper of gifts. Indirectly also we are benefiting the ladies

of the Victoria Veterinary Benevolent Fund, under the care of Mr. Shipley, who are giving in return for recompense a *quid pro quo* by knitting articles and working on clothes for the Army Veterinary Corps.

THE VETERINARY SURGEON WHO NEITHER READS NOR WRITES.

WE have often wondered what percentage of our members take in the veterinary papers and journals. No doubt the number is greater than that of those who write articles for their pages. We hope and trust that those who receive the periodicals always read them, but we are not sure. At one time of day the theorist, the writer, or the paper veterinary surgeon were often referred to with a touch of scorn or contempt by the self-styled practical man. The former were only romancing literary folk in his eyes, and half the things they put on paper was the result of a little fact and a lot of imagination and exaggeration. The practical man learnt everything worth learning long ago. He occasionally boasted with gusto that he never read any veterinary papers, and as to contributing anything to their pages—well, that would be only letting the other fellow know as much as he knew himself. And yet the fact remains, and is well known to the discerning one, that all the progress of the profession has been inseparably bound up and associated with the efforts of the editors, writers, and intellectual forces linked to the veterinary press. At this time of day many of the self-sacrificing writers are busily engaged answering their country's call, and it is the duty of those who remain behind to see that the work they have founded and carried on shall not suffer during their absence. Let those who are left put in a little extra work for the good of the cause and send up clinicals that will gladden the editor's heart and form interesting and delectable matter for those at the front to read. Our comrades there will do their duty so much the better for having their minds drawn away for a few moments from the martial scenes around them. When they come back, doubtless they will recompense us for the slight trouble we have been put to by recording cases from the rich store of clinical experience which they are now obtaining.

Whenever we meet a man who has got behind the times in his

profession and who never rises above a certain low level, we almost invariably find that he never takes in or reads any veterinary literature. His conversation is terribly limited, and his views ancient and cobwebby. But when we encounter an advancing member of the profession we see evidence around of a plenitude of up-to-date veterinary literature, and occasionally a small but well-selected library of technical books. The conversation of this man is often interesting and generally profitable to the listener. He is awake and alert. His intellect, contrary to that of the man who neither reads nor writes, is active and keen, and this phase of mind is beneficially reflected in his everyday practice and work. The advancement of knowledge has never been furthered by those who are "larnt up." True progress in science has ever been the outcome of the labours of thoughtful men, who, while not discarding anything really good in past practice, have ever been anxious to better the results of present procedure, and have never been entirely satisfied with things as they are. The dissatisfied fellows have been the ones that have advanced, for by reading and writing they have been able to see that a standstill position was not satisfactory. The veterinary surgeon who does not read the technical journals of his calling is foolish and probably a poor practitioner. The man (chiefly in a peaceful home in the country) who looks forward with delight to getting his professional periodical weekly or monthly, and who reads it eagerly, has one other duty to perform, and that is to write something culled from his own plentiful experience for the benefit of his professional brethren. Reading makes a thoughtful man, writing an exact man, and speaking a ready man. He who records his cases adds to the sum of knowledge and helps to make his science more accurate, and no man who claims to be a good practitioner should be without his weekly or monthly veterinary periodical.

PERSONAL.

DR. B. F. KAUPP, Commissioner of Public Health, Spartanburg, S.C., has been appointed Pathologist to the Agricultural and Mechanical College of North Carolina, where he will have special charge of investigations in the poultry department at the Government experiment station. Dr. Kaupp has recently published a most excellent little book on the diseases of birds, especially poultry, and his new appointment will give him special opportunities for following up his researches in this direction.

Original Articles.

STUDIES IN THE IMMUNITY TO TUBERCULAR DISEASE.*

II.—AUTOINOCULATION AND THE TUBERCULIN DIAGNOSTIC REACTION.

BY CHARLES C. TWORT, M.D. ABERD.

Baird Memorial Fellow.

It is often maintained that most of the specific lysin for the tubercle bacillus is fabricated by the tubercular tissue, and not usually by any of the normal organs of the body, while agglutinins and precipitins are produced by the normal cells. This is said to be the reason why it is so difficult to render a sound person sensitive to tuberculin by the previous inoculation of it. If one considers the production of lysins to bacilli other than tubercle bacilli, and if one takes into account the formation of the specific ferments to practically any foreign proteid, it would appear that the above hypothesis is very unlikely to be correct.

If it is to the presence of the lysins that the tuberculin reaction be due, then one may safely assume that the temperature produced by the inoculation of a diagnostic vaccine, in an animal suffering from such a disease as Johne's disease, relies upon the same type of anticorps; but in this last mentioned disease the histological changes are quite different from those found in tubercular disease, the only resemblance being in a certain amount of epithelioid and round-celled infiltration, which is present in both cases.

I have already shown [1] that a lysin capable of destroying Johne's bacillus may be produced by an animal on inoculating material other than acid-fast bacilli, and where there are evidently no pathological lesions in any way related to those of tubercular disease. Although these lysins are non-specific, they are sometimes very powerful; in fact as powerful as any of the specific lysins that I have been able to demonstrate.

The statement that tuberculin is toxic only for those who suffer from tubercular disease, and that a normal person cannot be rendered sensitive to it by the previous inoculation of dead

* From the Laboratories of the Brown Institution, University of London.

bacilli, must be considerably modified at the present time, for it has been shown that not only can the specific antibodies be demonstrated in the blood of animals subjected to the inoculation of a tubercle bacillus vaccine, but also that these animals will give a typical reaction. Wolff-Eisner sensitized his animals by the inoculation of crushed tubercle bacilli; Sata by the intravenous inoculation of dead tubercle bacilli. Bang and Andersen [2] quite recently have obtained results of a similar kind. These experiments are not at all surprising, for the inoculation of most foreign proteids will usually lead to a hypersensitiveness on the part of the animal for the proteid. If in an animal immunized to tubercle bacilli the temperature was not influenced by the inoculation of the same variety of bacillus at a later date, then one would be confronted with a very interesting fact; but the tubercle bacillus has shown itself to be the same as other proteids in this respect, and we should not have expected it to be otherwise. The temperature is unaffected with a very small dose, and with a still larger dose it falls (Friedberger). The tuberculin reaction is evidently produced by a medium sized dose, while an anaphylactic reaction is the result of a large dose, and thus the difference between these two reactions will in this respect only be that of the quantity of material inoculated.

For my part I have found that it is not difficult to render rabbits sensitive to tuberculin. A single intravenous inoculation of an emulsion of dead acid-fast bacilli, followed two to four weeks later by a second injection will, in a certain proportion of the animals, lead to rapid death; this occurs usually from two to twenty-four hours after the second injection is made. The dose may be a tenth to a hundredth of the normal fatal dose for an untreated animal, and it is not always necessary to use the same variety of bacillus as that with which the hypersensitive state was attained. The intravenous is the best method of inoculation for these experiments, the immunity being more difficult to obtain when inoculating by other channels. Also for the second inoculation, the intravenous is the best channel to inoculate by.

As is well known, there is usually an absence of any temperature in pseudo-tuberculous enteritis of cattle and in leprosy. The probable reason for this is to be found in the absence of any autoinoculation, and to the absence of soluble toxins.

There are other reasons for assuming that no soluble toxin is secreted by these bacilli, besides the fact that no temperature rise is noted during the natural course of the disease. In a previous paper I have shown, in collaboration with T. Craig [3], that the intravenous inoculation of a large dose of an emulsion of living acid-fast bacilli, such as the tubercle bacillus or *B. phlei*, causes a marked rise of temperature in the animal, while a similar dose of Johne's bacillus is without any appreciable effect. In the absence of a workable culture of the lepra bacilli it has, of course, been impossible to perform a parallel experiment with them; the necessary admixture of cells might materially alter the result, but I am convinced that inoculated alone the bacilli would leave the temperature unaffected. Again, as will be mentioned further on, the toxicity of Johne's bacillus for guinea-pigs' leucocytes "in vitro" is less marked than that of tubercle bacilli, and it appears probable that the cells remain intact until the bacilli commence to disintegrate, a point, however, difficult to determine. Another very important factor against the presence of a soluble toxin in these "non-caseating" diseases is the enormous number of bacilli found in the lesions, while the cells, situated right in the midst of the micro-organisms, stain perfectly, and are to all appearances quite normal. Even those cells packed with bacilli take on to a certain extent the blue stain, and I do not believe that their vitality is materially impaired. Quite a different picture is given by the examination of a tubercular nodule; the cells in the centre of the tumour are so necrosed as to be unrecognizable, and but few bacilli are found, while at the margins of the nodule where the tissue is relatively sound, bacilli may be fairly abundant.

A probable explanation for the absence of any auto-inoculation is, in my opinion, that these bacilli, unlike tubercle bacilli, are not killed out in the host, or if they do die it is only as isolated members, the death of which produces no appreciable effect on the diseased animal. It must be remembered, however, that the inoculation of a specific diagnostic vaccine will give a temperature in these animals as high as that obtained in a tubercular animal on inoculating tuberculin, and the question arises as to why this does not take place during the course of the disease. Here we come to the essence of the whole problem, and, as I believe, to the fundamental difference in the course of such diseases as leprosy and tuberculosis.

In the first place, is the temperature obtained on inoculation of a diagnostic vaccine produced by the same factors as that registered clinically during the natural course of the disease? It is probable that sometimes they are the same, but at others they appear to rest upon an entirely different foundation, and what may take place is, in my opinion, somewhat as follows. The tubercle bacillus secretes a soluble toxin, and in a tubercular animal if the toxin is not got rid of fast enough, mechanically by the kidney, or by neutralization, then there is a rise of temperature accompanied usually by an increased activity on the part of the defence mechanism of the host, and a subsequent fall of the temperature, the well-being of the patient being restored. In leprosy and Johnne's disease no parallel condition of affairs exists, as these bacilli secrete little or no soluble toxin. In tuberculosis the toxin, if in sufficient quantity, is probably to a certain extent detrimental to the cells, but if in small quantity it appears to excite them, and leads to destruction of the bacilli, for which we have evidence in the experiments of Achard on the stimulating effect of tuberculin for leucocytes.

The bacilli incorporated in the leucocytes become digested probably very slowly, but the product of their digestion is intensely poisonous for the leucocytes, and even if it is thrown out by the cells it must inevitably act upon the other cells in the neighbourhood. As a matter of fact, if the leucocytes are ultimately killed, it is quite immaterial whether the bacilli are destroyed inside or outside the cells, for the products of the disintegrated bacilli will eventually exercise their toxic effect on the surrounding cells, and under certain circumstances on the vital cells, when we shall have a rise of temperature and other symptoms of intoxication. In this case we are in the presence of an auto-inoculation of the second variety, but I believe this variety to be the exception.

An important feature in Johnne's disease is that the pathological lesions are not enveloped by a capsule of fibrous tissue as they are in tuberculosis, but blend imperceptibly with the normal tissue, so that in this case any toxins which may be formed will be able to get away gradually and be excreted or destroyed at leisure; whereas in tubercular disease the toxins are prevented from escaping, and in the restricted diseased area the bacilli and cells reacting upon each other finally lead to destruction of both.

I may here again refer to the experiments that I have performed on the toxicity of several of the acid-fast bacilli for guinea-pigs' leucocytes *in vitro*, when, as already mentioned, those in contact with tubercle bacilli are earlier disintegrated than those in contact with Johne's bacillus, which shows that the tubercle bacilli are more toxic for them; while *B. phlei* takes up an intermediate position. Before actual disintegration takes place, one can see that the phagocytes mixed with the tubercle bacilli die earlier than the others, as this is the first tube to become contaminated with the ordinary bacteria of the air. *In vivo* the difference between the toxicity is probably more marked, for the leucocytes receive more or less normal nourishment, and it appears that in the animal body Hansen's and Johne's bacilli can live in the cells almost indefinitely without destroying their vitality.

The temperature produced on the inoculation of a diagnostic vaccine is governed by a mechanism which may sometimes be similar to that of an auto-inoculation, viz., when the product of the digestion of the bacilli is free to act upon the susceptible centres of the animal economy, but according to the theory under discussion the temperature of an auto-inoculation is usually caused by the soluble toxins.

The result of the inoculation of tuberculin into a tubercular animal is usually to produce a certain amount of hyperæmia, which may be focal or local, but, unlike most toxins causing a local inflammation, its action is delayed for several hours. The majority of other toxins that cause inflammation act very rapidly, a few minutes being sufficient in some cases, but the local reaction produced by the inoculation of tuberculin may not appear for several hours, and requires twenty-four to forty-eight hours before it is at its height. A general reaction, which may be considered really as a focal reaction, takes place at an earlier hour than a local reaction. The tuberculin reaction can thus hardly be the result of the direct action of a toxin without the intervention of any anticorps, for otherwise it should be fixed almost at once by the hypersensitive cells of a tubercular animal. Although there is no doubt that the mechanism of the reaction giving rise to an elevation of temperature and to a local or focal inflammation is not always the same, it is probable that the essence of the mechanism is in most, if not all, cases, the reaction of a specific

anticorps on its antigen. When the antigen is inoculated a certain amount of time is needed for the interaction to take place, and this will be more prolonged in a local reaction, as the absorption of the circulating anticorps will necessarily be slower than at the focus of the disease.

It is generally considered that the temperature produced by the injection of tuberculin is a result of the fermentation or lysis of the tubercle bacilli and their products which have been inoculated, the substance formed acting upon the tubercular tissue, which is dissolved, and gives rise to the tuberculin reaction. It seems simpler, however, to imagine the reaction as being caused by the toxic effect of the lysed tubercle bacilli and their products on certain vital parts of the animal economy, without bringing in the question of the cell necrosis. It is hardly necessary to consider whether the lysins act upon the whole bacilli or particles of them, or on their disintegrated, broken-down products; if the lysin commences at the bacillus it has only further to go before the final toxic product is reached. In most animals it appears that the action of the juices is slight upon the intact bacilli, no doubt owing to the fact that their coat is impermeable, for as shown by Wolff-Eisner the finely ground particles of the bacilli produce typical reactions in infinitely small quantities. The lipases would appear to be weaker than the proteases, or, put in another way, their task is harder.

Granted that the specific lysins give rise to the formation of a temperature producing toxin by their action on the tubercle bacillus particles and the broken-down protoplasmic debris of them, it is safe to assume that the diagnostic reaction produced in leprosy and Johne's disease is controlled by the same mechanism. The question now arises as to how one accounts for the presence of the specific lysins in the two last-mentioned diseases, and what stimulus gives rise to their formation if there is no *intra vitam* lysis of the bacilli? and, secondly, these lysins being present, why do they not attack the micro-organisms already in the body, and so give rise to the phenomena of auto-inoculation?

In answer to the first query it may be mentioned that, although I have pointed out that the bacilli of leprosy and pseudo-tuberculous enteritis do not appear to be destroyed in the animal body, it may be safely assumed that in no single disease caused

by animal or vegetable parasites do a certain number of the invading micro-organisms escape destruction; and the disintegration of these isolated units, distributed over a large area of the body, as they are in these two diseases, would amply suffice for the stimulation of an antibody production. These are very chronic diseases, so that plenty of time is given for the body to react against the incessant stimuli to which it is subjected, but even if they were not more chronic than tuberculosis I should not consider this a serious objection. It must be remembered that in treating many other diseases, both acute and chronic, by means of vaccines, the quantity of material inoculated, in order to excite production of the anticorps, is very small compared with the number of bacilli that exist in the patient.

In my experiments on the production of agglutinins and complement-fixing antibodies I have found it easier to demonstrate them when using dead than when using living bacilli. Both lots of bacilli are distributed equally throughout the body, but whereas the dead ones all commence to be attacked by the juices of the host at once, a great number of the living ones escape altogether. The tendency would thus be for a greater quantity of anticorps to be produced against the dead than against the living bacilli, although it would be slow in both cases. The difficulty experienced by the juices to attack bacilli is evidenced by the fact that an unground emulsion is the weakest of all tuberculins, although it contains the greatest amount of protoxin. In many cases, especially in diseases due to micrococci, the highest degree of immunity is reached by using living attenuated vaccines, but the micro-organism we have to deal with here is obviously very different to an acid-fast bacillus. The highest degree of immunity appears to be reached by the inoculation of, or infection with, a micro-organism that causes a general, usually violent, reaction on the part of the body, the latter eventually gaining the upper hand. The most typical examples of this are found in the exanthematous fevers.

As to why the lysins do not react upon the micro-organisms in the animal body, we must bear in mind the fundamental difference between living and dead bacilli, and this difference is of special importance in considering diseases due to acid-fast bacilli, owing to the peculiar resistance of the last-mentioned to destruction either by specific anticorps or by ordinary chemical reagents. It

may be argued that the inoculation of a vaccine made up of living bacilli will give rise to a reaction as typical as when an ordinary vaccine is used, but there are essential points of difference between the bacilli obtained from an artificial culture, and those present in the animal body, and at the same time there is probably always plenty of dead material even in a vaccine of living bacilli.

It is generally recognized that micro-organisms having once become established in the body gradually acquire a certain immunity to the destructive agents of the host, as the latter does to them, and the victory rests on the side of that which ultimately develops the stronger immunity.

This may be easily shown by experimenting with animal parasites and chemical therapeutical reagents as demonstrated by Ehrlich. He found that by the injection of certain compounds of the heavy metals, or especially compounds containing arsenic, into animals infected with trypanosomes or treponemas, there resulted an apparent sterilization of the body; but this was found to be a fallacy, as several days later the blood was again swarming with parasites, and curiously enough the parasites of the relapse were more or less immune to the chemical reagent to which they had been previously subjected. It is for this reason that Ehrlich advocates the treatment of diseases of this kind with a single heavy dose of the reagent. In the experiments that I have performed with Levaditi on the trypanotoxin of *B. subtilis* [4], it was found that contact of trypanosomes (*T. brucei*) with the toxin for a few minutes was sufficient for the production of a resistant race; that is to say, the infection of a mouse with this mixture, or the centrifuged and washed trypanosomes from the mixture, resulted in the development of a resistant race. In the same way by submitting the trypanosomes to a few minutes' contact with a specific trypanolytic serum, and inoculating them into a mouse, the trypanosomes recovered from this mouse are resistant to the above serum. Trypanosomes seem to lend themselves especially to these experiments, for it is not in all animal parasites that the above phenomena can be so easily demonstrated. In our experiments on *Leishmania tropica* we were unable to get an immune race to any of the different toxins that we used.

How clearly practically all inoculation experiments with acid-fast bacilli show that the time elapsing before they really get a hold is considerable, and that once having acquired the essentials necessary for growth they develop with rapidity. On going from the animal body to the test tube again, there is often a similar period of incubation as it were before the bacilli get a hold, for what they acquire in the test tube they may lose in the body, and *vice versa*. Of course there are many bacilli which will grow vigorously at once on inoculation into an animal, or when isolated from the latter on to laboratory media.

As a general conclusion from the foregoing it would appear that the temperature produced by an auto-inoculation is sometimes, but not usually, governed by the same mechanism as that which follows on the inoculation of tuberculin for diagnostic or other purposes. The soluble toxin secreted by the tubercle bacillus is the usual cause of the rise of temperature during the ordinary course of tubercular disease, but in Johne's disease and leprosy no such condition is produced, as the causative bacilli secrete no toxin capable of influencing the temperature. Death of the bacilli leads to their disintegration, and caseation of the surrounding tissues follows; in a sensitive animal this process may produce a high rise of temperature.

[1] TWORT, C. C. : Thesis, Aberdeen, February, 1914.

[2] BANG, O., und ANDERSEN, C. W. : "Einige Untersuchungen über Komplementbindende Antistoffe bei experimenteller und spontaner Tuberculose sowie bei paratuberculöser Darmentzündung," *Centralb. f. Bakt.*, 1913, Bd. 69, Heft 7.

[3] TWORT, C. C., and CRAIG, T. : "The Pathogenicity of Johne's Bacilli compared with that of Other Acid-fast Bacilli for some of the Laboratory Animals," *Centralb. f. Bakt.*, 1913, Bd. 68, Heft 5-6, p. 455.

[4] LEVADITI et TWORT, C. C. : "La trypanotoxine du *Bacillus subtilis*," *C. R. Soc. de Biol.*, Tome 70 et 71, 1911.

ON THE TRAINING OF VETERINARY SURGEONS FOR
PUBLIC DUTIES IN CONNECTION WITH THE
PREVENTION OF DISEASE WITH REFERENCE TO
THE INSTITUTION OF A DIPLOMA IN VETERI-
NARY STATE MEDICINE.

By SHERIDAN DELÉPINE, M.B., C.M., M.Sc.

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[Reprinted from *Public Health*, September, 1914, the Journal of the Society of Medical
Officers of Health.]

It has long been known to medical and veterinary pathologists that the control and prevention of infectious diseases must be based upon an exact knowledge of the etiology of these diseases, of the life history of the causal animal or vegetable parasites, and of the conditions favouring the transmission of disease and the occurrence of epidemics and of epizootics. It is now generally accepted that preventive medicine even in its most administrative aspect is based upon pathology, epidemiology, and epizootiology.

The importance of the diseases of animals that are communicable to man was early recognized by public health administrators; but while the public health service was in its infancy no adequate provision could be made for the administrative control of animal diseases. It, however, soon became obvious that the duties of medical officers of health did not allow them the time necessary to make themselves familiar with all the diseases of animals that are liable to affect man, and that sanitary inspectors from want of previous training could not be entrusted with this part of the work. It was then realized that the co-operation of the veterinary profession was not only desirable, but necessary. This appeared to us in Manchester so clearly indicated, that when in 1892 we were engaged in reorganizing the courses for the Diploma in Public Health, I suggested that provision should also be made for instruction in veterinary preventive medicine. This, in my opinion, was needed not only for the purpose of improving the means available for the prevention of human diseases, but also for the purpose of helping agriculturists in their efforts to reduce the losses due to diseases to which livestock are liable. The knowledge which had already been gained regarding the causes of many animal diseases seemed to be sufficiently advanced to justify the establishment of a public

veterinary service, somewhat on the lines of the public health service. The necessity of special training had been recognized in the report of the Departmental Committee on Pleuro-Pneumonia and Tuberculosis in 1888 (Part I, p. xiii, paragraphs 55 and 56).

There were, however, differences of opinion upon the subject, and several of the leading members of the veterinary profession whom I consulted showed themselves adverse to the institution of post-graduate courses such as were contemplated. They urged that the veterinary students who had taken a full course of instruction for the membership of the Royal College of Veterinary Surgeons and obtained the ordinary diploma of the College were competent to undertake any of the duties connected with the public services. But in the course of the subsequent ten years various sanitary authorities realized the importance of having the assistance of specially trained veterinary officers, more specially in connection with meat inspection and the control of bovine tuberculosis. The same need was felt in agricultural circles. After careful inquiries and consultations, the University of Manchester decided to institute a post-graduate course in veterinary hygiene and preventive medicine, and to grant a diploma to members of the Royal College of Veterinary Surgeons who had attended satisfactorily the course prescribed by the University, and passed an examination corresponding in scope to the examination for the Diploma in Public Health. This scheme was realized in 1902.

Considering the fact that there was not at the time outside the Board of Agriculture any regular opening for specially trained veterinary officers except in connection with the public health departments of counties and county boroughs, it was thought expedient to direct the teaching and examination towards those branches of veterinary state medicine that had a special bearing upon the prevention and control of the diseases of animals that are communicable to man. It was realized, however, that when other branches of a state veterinary service were organized certain additions would have to be made to the curriculum, so as to meet special requirements. It was not thought desirable to widen the scope of the course to such an extent as to make it impossible for the students to obtain a *practical mastery* of the subjects selected for special study.

After careful inquiry it was ascertained that under the prevailing conditions it would be useless to offer a course of more than nine months' duration (that is, a whole academic year), because there would be extremely few, if any, veterinary graduates who would be willing to incur the loss of time and money which a course extending over more than one year would involve.

In the selection of subjects of study we were guided by the belief that what the average post-graduate student wanted most was to obtain a practical knowledge of (1) the scientific methods which are constantly needed in the investigation of the causes and phenomena of disease; (2) the practical application of the knowledge gained by these methods to the administrative control of disease.

With regard to students showing special aptitude for research, and desiring to do some special work, it was thought that the best way to meet their case was to offer them opportunities to carry out suitable investigations in the laboratory under the supervision of the staff. But the main object was to give the men attending the University post-graduate course a sound, practical knowledge of scientific and administrative methods which had proved of value or might become useful in the investigation and prevention of disease. This appeared to be the best way to prepare the men for the efficient discharge of the important and responsible duties that might be entrusted to them by public authorities.

In order to carry out this scheme, it was found necessary that post-graduate students should obtain their instruction not only from pathologists, bacteriologists, zoologists, chemists, and other laboratory workers, but also from veterinary officials engaged in administrative work in connection with the inspection of farms, markets, abattoirs, &c. The subjects which appeared most suitable for teaching of a practical character in the laboratory were comparative pathology, with special reference to the causes and mode of spread of disease, the life history of the most important animal and vegetable parasites, the influence of various factors upon the occurrence and distribution of disease, and other subjects generally included in epidemiology or epizootiology. It was also thought desirable to give a place in the curriculum to practical chemistry, more specially with reference to the analysis of water, air, soil, and various dairy produce and foodstuffs, not

with the object of making the students competent analytical chemists, but rather for the purpose of making them familiar with the meaning of analytical results, and also in order to complete a part of their scientific training, which is often neglected at an early stage.

The scope of the instruction which it has been found possible to impart with some success during the last twelve years is indicated in a general way in the regulations of the University of Manchester as regards the subjects of the examination for the Diploma in Veterinary State Medicine. (The examination lasts four days, three of which are devoted to practical work and oral examinations.)

(1) Practical chemistry, with special reference to veterinary hygiene.

(a) Methods of qualitative and quantitative analysis, with special reference to the examination of air, water, soil, and foods.

(b) The principles of warming and ventilation.

(c) Meteorological instruments and their use.

(2) Practical pathology, parasitology, and microscopy.

(a) Practical bacteriology, including bacteriological analysis of air, water, foods, and soils. Disinfection and sterilization. Isolation and identification of pathogenic bacteria.

(b) Recognition of animal parasites. Life history of some of the most important animal parasites.

(c) Morbid anatomy of lesions associated with parasitic diseases (characters of diseased meat).

(d) Microscopical impurities of foods, air, and water.

(3) Comparative pathology of domesticated animals.

Pathology of epizootic diseases and of diseases due to unwholesome food, air, water. Influence of housing, climate, season, soil. Geographical distribution of diseases. Artificial and natural immunity. Effects of heredity on liability to disease.

(4) Veterinary hygiene.

Construction of stables, byres, pigsties, kennels, &c. Hospitals, abattoirs. Methods of ventilation, drainage, disposal of refuse. Foods. Water supply. Methods of transport.

(5) Sanitary law and administration.

Control of contagious diseases under the provisions of the Contagious Diseases of Animals Act. Statutes and by-laws.

(6) Inspection of meat, dairies, cowsheds, farms, &c. Sanitary reporting.

In the conduct of the examination the University has had the assistance of the highest authorities in the kingdom, viz., of Sir John M'Fadyean and Sir Stewart Stockman.

That the institution of a post-graduate course in veterinary state medicine has met a want is shown by the fact that a number of men of high standing have taken advantage of the opportunities offered by the University, but the most convincing proof of the need which veterinary surgeons wishing to enter public service have of special post-graduate instruction has been given by the Royal College of Veterinary Surgeons, who have quite recently instituted a Diploma in Veterinary State Medicine* on lines similar to those which have been described above.

REPORT ON THE RESULTS OBTAINED BY THE SPECIAL COMMITTEE FOR INVESTIGATION OF INFECTIOUS ANÆMIA OF HORSE.

(HORSE ADMINISTRATION BUREAU, TOKYO, 1914).

(1) INTRODUCTION.

(a) Organization of the Committee for the Investigation of Infectious Anæmia of Horse.

THE Special Committee for the Investigation of Infectious Anæmia of Horse was organized by the Government in July, 1909, and it has been put under the control of the Bureau of Horse Administration. The reason for establishing the committee is as follows:—

Lately outbreaks of a peculiar horse disease were noticed at several important breeding districts in Hokkaido and the north-eastern part of Hondo (main island of Japan). Several hundreds have already been lost both in the Remount Depôt of Military Horses and among horse owners. This disease, which causes pernicious anæmia, is mainly confined to the pasturing districts. Since almost all the horses that contract the disease are sure to die, it has created considerable alarm among horse breeders in Japan. Despite the fact that its etiology had been assiduously investigated at several governmental institutions, satisfactory

* The term Veterinary State Medicine was adopted by the University of Manchester to indicate the fact that the object which the University had in view was the preparation of men for state and other public services in which a knowledge of veterinary medicine was of importance.

results had not been obtained. Moreover, in the affected regions no means of checking the disease had ever been attempted because of the entire lack of knowledge of its causative factors. Judging from the invasion and the progress of symptoms we cannot deny that the disease is of an infectious nature. Should its etiology and preventive means not be made clear soon, the disease would cause an unrestorable loss upon the horses of the whole empire of Japan.

(b) Object and Methods of Investigations.

The object of the Committee is to investigate the nature of the disease and to find out the most practical methods of treatment and prevention for immediate need, leaving detailed scientific research on the disease for the future.

The investigations have been carried on along the following three lines, and the commissioners have been divided into three groups accordingly:—

(1) Careful investigations of the conditions of initial outbreak and spread of the disease, clinical examination and treatments, methods of prevention, &c.

(2) Protistologic, pathologic, and chemical study of the disease.

(3) Comparison of the disease with similar ones occurring among the horses of foreign countries.

At the request of the commissioners ten experiment stations were founded at different times during the past six years.

(c) Results of Investigations.

As the chief results accomplished by the Committee the following five items may be mentioned:—

(1) In September, 1909, "Rules for the Remedy of Infectious Anæmia of Horse" and "Explanation of Symptoms" were drawn up by the Committee and submitted to the Government as a draft for the "Investigation for the Prevention of Infectious Anæmia of Horse" to be issued by the latter.

(2) In May, 1911, a draft for the Laws for the Prevention of Infectious Anæmia of Horse and various rules therewith connected were discussed by the Committee and resolutions were made.

(3) In December, 1911, the Results of Investigation obtained by the Special Committee for Infectious Anæmia of Horse were discussed by the Committee and were made public.

(4) In April, 1913, a project of Law for the Prevention of Infectious Anæmia and rules therewith connected were again discussed and amended (*vide* of the Preventive Methods on p. 17.)

(5) In September, 1913, the Report upon the results obtained by the Special Committee for Investigation of Infectious Anæmia of Horse was discussed, revised and supplemented by the Committee.

The investigation of the Committee lasted for four years and ten months, extending from July, 1909, to March, 1914. Animals used for experiments by the Committee numbered over a thousand: 980 horses, 1 donkey, 7 calves, 5 goats, 6 sheep, 7 pigs and a few other small animals. The entire expenditure amounted to over 80,000 yen.

(2) SHORT HISTORY OF THE APPEARANCES AND SPREAD OF INFECTIOUS ANÆMIA AMONG HORSES.

It is certain that in olden times infectious anæmia did not exist among Japanese horses, but we have at present no way of ascertaining when and how outbreak of the disease took place for the first time in this country. Usually the appearance of the disease becomes known to the public at the time when it has already been spreading for several years to a considerable area, out-of-the-way pasturing districts among mountains being first invaded, where ignorant people totally lack the knowledge of preventive methods.

It may be concluded that the disease is confined to a part of Hokkaido and several districts of the north-eastern part of Hondo, and does not invade the southern part of Japan, because the pasturing is restricted in the north, this being one of the necessary conditions for the transmission of the disease.

The exact number of yearly losses is also unknown for the same reason as mentioned above. But inferring from what has been learned from frequent visits of the commissioners to the infected regions, losses are not heavy at any place in the first year of outbreak. From the second year on the patients gradually increase in number. Tremendous losses follow for some years. A great majority of the horses succumb to the disease. Then slowly it is abated.

Any district once affected seems to retain the disease for a

considerable number of years. An instance in the province of Hidaka will illustrate this. Five or six years after the initial outbreak in a small village, Horoizumi, Urakawa Branch of Hokkaido-cho (the entire province of Hidaka is under the control of this office), they began to keep statistics of horses dying of the disease.

1900	27 horses	1905	7 horses.
1901	41 „	1906	18 „
1902	30 „	1907	5 „
1903	10 „	1908	2 „
1904	14 „	1909	2 „

From this table it will be seen that even more than ten years after the initial outbreak cases are still found.

The following will show that if proper preventive methods be applied, the damage occasioned by the disease will be considerably reduced, even if it is not possible to check it out of the district at once. In July, 1911, it was reported that many horses were affected by the disease in a part of Sekimoto village, Taga Country, Ibaraki Prefecture, and our careful investigation revealed that the virus was imported from a neighbouring pasture of the prefecture of Fukushima, where a great many horses had already succumbed to it. We soon came to the conclusion that this was an excellent place to carry out most profitably the experiments of prevention. As the first step all the horses were carefully examined. Those which showed even the slightest sign of the symptoms characteristic of the disease were bought and killed. As the result of this 107 horses of the village were reduced to 45, 24 having died of the disease and 38 having been killed. This method proved to be very effective, since not a single horse of those remaining succumbed to the disease, though some have had a weak form of it. This seems to give an important side-light that, though one infected horse is able to affect the whole herd, yet those animals which have had a slight form of the disease seem to acquire immunity and do not show any further symptoms at all.

We regret that we do not have exact statistics of yearly losses in various localities. However, the following numbers show the totals of cases reported by local governors since the establishment of the Committee:—

1910	341	horses
1911	376	„
1912	359	„
1913	263	„

It may be added that the above cases are those which were reported to the local governors by the horse owners and veterinary practitioners. Besides these, there must have been cases which remained unreported due either to the negligence on the part of horse owners or to the lack of regulations for reporting. In any event we can estimate without grave mistake the whole number of patients in Japan to be between 400 and 500. Lately the cases are decreasing in number, due partly to the fact that the disease has already spread as extensively as it possibly can and partly to the immunity acquired by the horses of affected districts.

The horses belonging to the remount depôt of military horses have contracted the disease, and a considerable number has already been lost. When the initial outbreak took place we do not know, but since 1905 a great many horses have died from deaths attributed to the diseases of the spinal cord, of the heart, anæmia, &c., in the pastures of the branches of the remount depôt at Hagino, Yamagata Prefecture, Kajiya-zawa, Miyagi Prefecture, Rokuhara, Iwate Prefecture. In 1907 it was discovered that all the losses had been due to infectious pernicious anæmia. Ever since that date the disease has invaded all the pastures of the branches of the remount depôt and the maximum losses came in 1910; the number of the horses that died and were killed taken together reaches over 500. Since then the number of patients has decreased as the result of strictly carrying out the preventive measures. As the virus is usually introduced into the pastures of the branches of the remount depôt through two-year horses, which look healthy when bought, and afterwards prove to have been infected when pastured in the summer, our constant effort to annihilate the disease completely has not as yet been rewarded. And even now fairly heavy losses take place every year.

(3) PATHOGENESIS.

(a) *Nature of the Disease.*

The great spread of infectious anæmia in pastures is due to the transmission of the virus from one individual to another by

insects. Very seldom are horses infected through the alimentary canal in stables.

Unless the disease is of a subacute nature and death soon ensues, it is usually characterized by its insidious and chronic course. The first few months after infection frequent intermittent febrile attacks occur. But when the illness is alleviated a little, patients as a rule acquire the power of resistance against the virus, and febrile attacks decrease in number until they return to normal. It need hardly be mentioned that the virus is retained in the body for a considerable length of time.

The chief pathologic change of the disease consists in a marked decrease of the red blood corpuscles. Also more or less noticeable lesions are found in the heart, liver, spleen, kidneys, lymph glands, bone marrow, &c. Mortality is between 30 per cent. and 70 per cent., according to the conditions of the disease, climate, care of patients, &c.

Blood examinations of the affected horses reveal that three to four millions of red corpuscles are present in 1 c.mm., and in advanced cases less than one million in so much blood; that is, less than one-seventh of the number of red corpuscles is found in normal blood (six to seven millions). If the red corpuscles of the patient's blood be precipitated to the bottom of a graduate, its coagulation being prevented, the corpuscular layer measures less than one-tenth the whole volume, while in normal blood it is more than four-tenths.

(b) Etiology.

In order to detect the causative agent of the disease the blood and viscera of patients were subjected to all possible microscopical and culture methods with negative results. It was found that the virus passes through Berkefeld's and Chamberland's filter. It should be remarked that the apparatus had been tested with *Bacillus prodigiosus* beforehand and had been proved really bacteria-proof. From this we can infer that the disease is caused by one of the ultramicroscopic organisms.

That the virus is present in the blood and various viscera was demonstrated by the following experiments. An animal of quite advanced case was killed and ten different organs were taken out of its cadaver (blood, spleen, liver, kidneys, spinal cord, lymph glands, salivary glands, muscles, lungs and bone marrow).

Each organ was injected into two healthy individuals, thus using twenty experimental horses altogether (experimental horses-extra series, Nos. 9-18, 21-30). Every one of them became affected in the course of from eleven to fifteen days. Urine and milk of a patient were separately injected into healthy individuals (experimental horses-extra series, Nos. 1-3). They also showed typical symptoms of the disease. The conclusion can be drawn from the above experiment that the virus is excreted in urine and milk. We could not, however, detect it in the fæces and sweat of sick horses.

If blood be drawn from a patient during a febrile attack and even a small quantity of it, say 5 c.c., be injected into a healthy horse, the latter thus becomes affected. A horse receiving intravenously 0.5 c.c. of serum diluted with saline solution showed characteristic symptoms of the disease after an incubation of seventeen days.

According to the results obtained by the experiments performed upon sixteen horses, the first febrile attack came from nine to twenty-nine days after a subcutaneous inoculation of 20 c.c. of the patient's blood. In one instance, in which a horse received 100 c.c. of the patient's blood subcutaneously, the latent period was only three days.

Healthy horses (experimental horses, Nos. 510-630) receiving patient's blood with 2.5 per cent. to 5 per cent. of sodium taurocholate remained unaffected. This seems to indicate that the causative agent is not of bacterial, but of protozoan, nature.

THE RETENTION OF THE VIRUS FOR A LONG TIME IN THE BLOOD OF CONVALESCENT HORSES.

Not only can it be demonstrated that the virus of the disease is in the blood at intervals between febrile attacks, but it was also proved that it is retained in the blood for a long time even after recovery, and causes future outbreaks of the malady. In order to determine accurately the length of the time of retention of the virus in clinically recovered horses, we performed the following experiments:—

Blood was drawn from

2 horses	3 months after recovery
2 " "	6 " " "
3 " "	8 " " "

2 horses 9 months after recovery.

1 horse	11	„	„	„
4 horses	12	„	„	„
3 „	13	„	„	„
2 „	14	„	„	„
1 horse	16	„	„	„
1 „	22	„	„	„

and was injected subcutaneously into twenty-one healthy horses. All became affected except two; one was of the number which received the serum taken three months after recovery, and the other of those that received the serum taken thirteen months after recovery. Since the virus was not detected in the blood of these two experimental horses they were killed, and various viscera (liver, spleen, lungs, kidneys, lymph glands, brain, muscles, bone marrow, salivary glands) were taken out of the cadavers. They were again injected into healthy animals. All of them manifested afterwards characteristic symptoms of the disease. This undoubtedly shows that the virus was present in the viscera, though it was not demonstrated in the blood.

Three horses, which had completely recovered from heavy attack of the disease and have been subjected to ordinary work in a regiment, were selected for experiments. Their blood was drawn from time to time for three years and was injected into healthy animals. By the blood taken from a horse three years after recovery, two out of three became affected within the usual period of incubation. In another experiment on two horses, which received the blood drawn four years after recovery, we found that one of them became ill after a latent period of sixty-five days. In still another experiment on two horses, which received the blood taken five years after recovery, the result was negative.

These experiments clearly show that the virus gradually diminishes its power and finally vanishes.

RELATION BETWEEN PATIENTS AND THEIR OFFSPRING.

Though the infection of the disease in stable is extremely rare, the relation between patients and their offspring must be of a peculiar nature. One can readily notice in affected districts that young horses rarely contract the disease. The following experiments were undertaken to clear up this point:—

(1) Blood was drawn from four foals brought forth by affected mothers, and was inoculated into four horses (experimental horses Nos. 443, 445, 446, 464). One was affected, two showed doubtful symptoms, and one gave negative result.

(2) Milk of patients (30-100 c.c.) was injected into three horses (experimental horses Nos. 563, 443, 566). All became affected after latent periods of twenty-four, forty-six, and forty-two days respectively.

(3) Milk of patients was given every morning internally to healthy stallions and colts, but no positive result was obtained.

(4) Blood was drawn from a young horse of an affected mare, before it began sucking, and was injected intravenously into two healthy horses (experimental horses Nos. 554 and 615). Two showed typical symptoms of the malady.

(5) A foal from an affected mare was stopped sucking at the age of a little over four months, and was kept outside the stable. It became ill, and died with typical symptoms of infectious anæmia.

From the above experiments we may be able to conclude that the virus is present in the milk of a patient, and that the virus also penetrates into the fœtus through the placenta. And the transmission of the disease to the young seems to be accomplished more frequently during its intrauterine life than through sucking virus-containing milk.

EXPERIMENTS ON VARIOUS ANIMALS.

In case the donkey contracts the disease, it usually shows acute symptoms and dies rather suddenly. As to animals outside the equine family the pig is most susceptible; young goats and sheep also show slight febrile conditions; calves, rats, guinea-pigs, rabbits and dogs have no susceptibility at all towards the disease.

(4) MODES OF INFECTION.

In investigating the appearance and spread of infectious anæmia among horses in Japan, it has been learned that very few cases develop in the stable, while in the pasture it usually spreads with an astonishing rapidity, a great majority, or even the entire herd, succumbing to it. To take a concrete example. At the branch remount depôt, where horses are pastured during the summer, many cases are met with, while in the regiments where horses are quartered in stables the disease does not spread out of

them, though a few sporadic cases may occur among reserve horses. No cases have as yet been recorded in which outbreak took place in the districts where horses are usually kept in stables, the spread of the disease having been restricted to pasturing districts. What seem to be sporadic cases encountered in breeding or working districts are in reality those introduced from other parts of the country.

From what has been mentioned above, it can be conjectured that there must be conditions peculiar to the pasture which favour infection of the disease. Consequently detailed investigations have been carried out along the following four lines, namely: (1) Infectivity of the patients' excretion; (2) infection through the alimentary canal; (3) infection in the stable; and (4) infection in natural environment. Towards the solution of the above problems the Committee has devoted most of its energy and time extending over six whole years. The number of the horses used for these experiments reached about 150.

(a) Infectivity of the Patients' Excretion.

(1) *Urine*.—Two horses received subcutaneously 100 c.c. of the patient's urine, and one other horse 150 c.c. After latent periods of eleven to seventeen days all three became affected. Three horses received subcutaneously 15 c.c. of a patient's urine. They showed typical symptoms after fifteen to twenty-five days (experimental horses-extra series, Nos. 2, 3, 31).

(2) *Fæces*.—Fæces of a patient were mixed with saline solution and were treated with Berkefeld's filter. The filtrate was injected into a horse without any effect whatever. Hence we may be able to conclude that the virus passes out in urine, but not in fæces. This result agrees well with that obtained by feeding experiments to be described in the next section.

(b) Infection through the Alimentary Canal.

100-200 c.c. of the patient's urine were given every day internally to two horses (experimental horses-extra series, Nos. 34, 47). All became affected in a little over thirty days. One horse (experimental horse No. 479), receiving 100 c.c. twice a day (once in the morning and the other time in the evening) for over 120 days, was not infected at all.

100 c.c. of the patient's blood were given to four horses (experimental horses-extra series, Nos. 9, 10, 43, 44) mixed with

the feed every day or every other day. Two out of the four became ill after about fifty days, and the remaining escaped affection.

Fæces of a patient were given mixed with the feed every day to five horses. The result was negative.

From the above experiments conclusion can be reached that the entrance of the virus into a healthy individual through its alimentary canal can actually take place; but, since infection by this mode is accomplished only by protracted application of an unnatural method, contact infection in nature, if any, must be a very slow and limited process.

(c) Infection in the Stable.

Patients and healthy individuals were quartered in the same stable to see if infection takes place among them. Of eleven horses used for the experiment only two became affected. The experiments were performed purposely during the winter, when the development of insects is suspended.

(1) For six months, from August, 1910, to January, 1911, three healthy animals (experimental horses Nos. 6-8) were kept with the patients at Hagino Branch Remount Dépôt. One horse became affected after sixty-four days, and in the other two the result was ambiguous.

(2) For five months, from December, 1910, to April, 1911, three healthy horses (experimental horses Nos. 90, 108, 487) were kept with a patient at the experiment station of the Agricultural College, Tokyo Imperial University. One of them was infected, and the other two showed negative result.

(3) For about ten months, from May, 1911, to February, 1912, two horses (experimental horses Nos. 105, 115) were kept with a patient at the Institute for Infectious Diseases. Neither of them became ill.

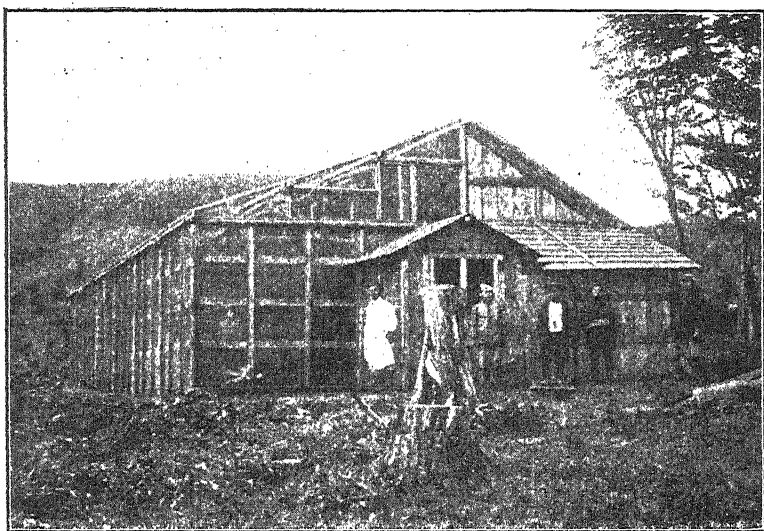
From the above experiments we can reach the conclusion that infection very rarely occurs in the stable. This result agrees with that of another experiment carried on in a stable from which the access of insects was prevented by means of wire netting (*vide* the next section).

(d) Infection in Natural Environment.

Several experiments were performed in the open air to determine the actual course of transmission of the disease. The following are the main problems to be solved:—

- (1) Does the virus winter in pasture?
- (2) How does infection take place when healthy animals are kept with patients or virus-carriers in the same pasture?
- (3) How is the virus transmitted from one horse to another in pasture?
- (4) How is the disease related to blood-sucking insects?

In order to solve the above questions pasturing experiments were carried on during four summers (1909-1913). Their progress and results therefrom are as follows:—



Wire-netting Stable. Open-air experiment station at the Izumi pasture of the Shirakawa Branch of Remount Depôt at an elevation of about 3,000 ft.

(1) It had long been known that terrible infection from the disease took place at pasture, but we did not have any information regarding the length of time of the retention of the virus there. To see whether or no the virus in our case persists for a long time, as in Texas fever, five healthy horses were kept over a month in the autumn of 1909 in the Higashima pasture belonging to Hagino branch of the remount depôt of the military horses, where many patients had been produced year after year until 1908. The result was negative. But from this we cannot deny the presence of the virus in the field; this negative result may be due to the absence of the transmitter of the disease; for the

experiment was performed rather late in the season. To exclude the above possibility the same experiment was repeated in 1910 at the Masugata section of Izumi pasture belonging to the Shirakawa branch remount depôt, where patients had been exceptionally abundant in 1909. Should the virus winter in some form or other, any healthy horses in the section would certainly become affected. Six horses good in flesh and spirits were pastured for 101 days in the summer (from July 5 to October 31), the usual season of prevalence of the disease. All subjects kept up their health, in spite of the fact that during the experiment insects were thriving and the horses were not well nourished owing to weak growth of grass there.

These experiments clearly show that the virus of the disease is not retained for a long time in pasture as is the germ of anthrax. Any pasture can, therefore, be considered perfectly healthy if the patients were produced in the preceding years.

(2) It is a well-known fact that infection from the disease usually takes place in the pasture, but not in the stable. However, to determine how dangerous the patients or the virus-carriers are in the case of the mixed pasturing, we must have recourse to pasturing experiments. They were, therefore, performed twice, once in 1910 and again in 1912, at Izumi pasture. In 1910, from July 5 to October 31 (119 days), four healthy horses (experimental horses Nos. 61, 62, 63, 64) were allowed to live with the seven virus-carriers in a special section entirely separated from other herds. All of the subjects contracted the disease. Two years later a similar experiment was tried. For six months, from May 1 to October 31, 1912, four healthy horses (experimental horses Nos. 471, 486, 492, 493) were kept with two patients and two virus-carriers. All the horses became affected; the earliest case appeared in sixteen days. In comparing the result of these experiments with that of the foregoing (pasturing of healthy horses alone) the difference is very pronounced, and we can hardly escape from the conclusion that the terrible spread of the disease was due to the intermingling of healthy horses with the patients or virus-carriers in the pasture.

(3) How is the virus transmitted from the patients or virus-carriers to healthy animals? The virus is excreted in urine, it is true, but in order to induce the disease artificially a large quantity of the urine (repetition of the internal administration of more than

100 c.c. each time) must be given. Moreover, a large portion of the patient's urine would soon find its way into the ground after excreted, and what is left on the surface would be disinfected by the direct sunlight. Urine, therefore, can safely be excluded from the causative factors of the transmission of the disease in the pasture.

To consider the difference between the pasture and the stable, excretion products are more abundant in the latter than in the former. But the proportion of cases appearing is just the reverse, as was described before. The cause of the infection must, therefore, be sought in a different direction. The problem of the transmission of the virus by the blood-sucking insects naturally suggests itself. In foreign countries experiments have been tried to test the theory of insect transmission in the allied diseases (infectious anæmia of Europe, swamp fever in America), but no positive results have as yet been obtained. As a matter of fact, some investigators disbelieve in such a theory. At present the relationships between the disease and insects, therefore, are obscure. To clear up the question, we performed on a large scale entomological experiments at a section of Izumi pasture where insects abound. A wire-netting stable and wooden enclosures were constructed (see illustration). The wire-netting stable is a gigantic cage, so to speak, 16·3 m. long, 7·2 m. wide, on one side (north side) of which is a wooden wall, three other sides and the roof being made of fine wire netting to prevent the access of the insects to the horses within. The wooden enclosure is a rectangular-fenced area without a roof, 18·1 m. long and 10·9 m. wide. Two or three enclosures were constructed with an interval of about 12·7 m. between them. These were to separate herds. In the above wire-netting stable both healthy horses and the patients were kept together, and were watched to see how the infection takes place without interference of insects.

Experiment 1.—In 1911 one patient and four healthy horses (experimental horses Nos. 397, 395, 399, 340) were let in. Two (experimental horses Nos. 395, 397) became affected after a protracted latent period. The other two remained healthy.

Experiment 2.—In 1912 six very advanced cases and two healthy horses (experimental horses Nos. 475, 472) were kept together for four months. One (experimental horse No. 475) became ill after six months, and the other remained perfectly healthy.

From these experiments it may be concluded that the disease can be propagated among the horses simply by living together without the aid of insects, provided the place be highly infested. But this mode of infection is very weak, and cannot be compared with what takes place in mixed pasturing in the open air.

The next experiment consists in keeping the patients and the healthy horses in separate enclosures during the season of the development of insects. Thus intercourse between the two sorts of animals was cut off, free access of insects to the animals being allowed.

Experiment 1.—In 1911, from July 5 to October 13, nine patients were kept in one enclosure to make it highly infested, while in one of the neighbouring healthy enclosures four healthy animals (experimental horses Nos. 341, 342, 404, 405) were received. The latter showed signs of being affected in one month, and finally every one of them manifested symptoms of advanced stage of the disease.

Experiment 2.—In 1912 five patients were put into an enclosure; two of them died in a short time; one fell into a heavy form of the disease; two did not show marked symptoms though strongly emaciated. In the enclosure A two healthy horses (experimental horses Nos. 466, 483) were kept throughout the whole length of the pasturing season. In the enclosure B four healthy horses, two at a time, were put in. Three of them (experimental horses Nos. 477, 491, 559) manifested typical symptoms; one (experimental horse No. 560) remained unaffected. The reason why in the Experiment 2 the proportion of the infection was smaller than in the Experiment 1 may be sought in the fact that in the former the virus was rather rare in the patients' enclosure.

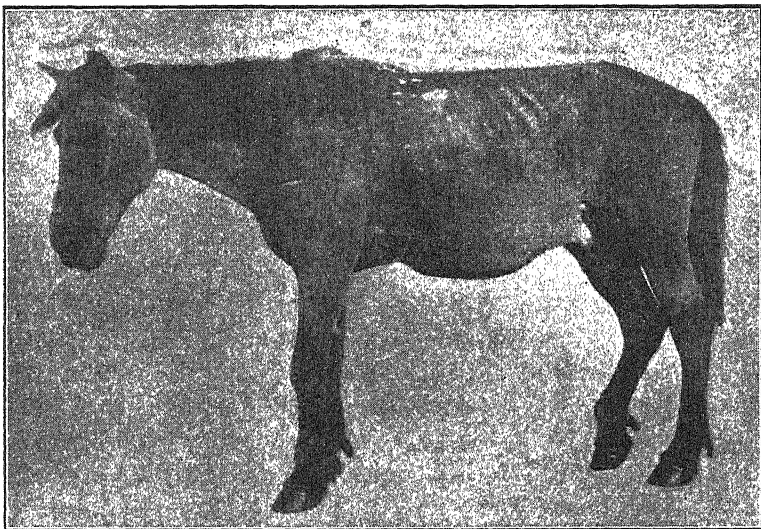
Experiment 3.—In 1913 the above experiment was repeated extending from May 1 to October 31. Nine patients were received in one enclosure. Two healthy horses (experimental horses Nos. 552, 564) were kept in the enclosure A during the experiment, and in the enclosure B four horses (experimental horses Nos. 572, 573, 565, 634) were let in, two at a time. The process of the infection was carefully watched. The result was very striking, all the healthy animals contracting the disease.

The above three experiments clearly demonstrate that the disease can be transmitted without intercourse between the

healthy and sick horses, when free access of insects is not prevented, and that under such circumstances the infection goes on in a degree as fierce as in the mixed pasturing. From this the conclusion may be drawn that the transmission of the disease under consideration is accomplished only through the agency of insects that are capable of flying.

(4) The insects and their allies which occur in pastures and attack animals are as follows: ticks, bot-flies, sand-flies, mosquitoes, horse-flies, &c.

(a) Ticks (*Ixodidæ*).—Ticks have no power of flying, and,



An advanced experimental case of infectious anæmia (Experimental Horse No. 534—gelding, 18 years old, sheared) photographed ten days prior to death. Notice the patient's great emaciation, depressed head and ears, lack of spirits, and œdema of the belly, the prepuce and the extremities.

moreover, if these parasites on the patients be transferred to the healthy horses, the latter do not become sick at all.

(b) Bot-flies (*Gastrophilus equi*).—These do not belong to the blood-sucking insects, but since its larvæ are found in the horse's stomach, the virus may thus be taken from the sick horses and transmitted to the healthy. To exclude the possibility several larvæ were taken out of the stomach of a horse dying of this disease, crushed in a mortar, filtered, and injected into healthy animals, but the result was negative. Furthermore, in 1912

bot-flies were exterminated from all the horses before pasturing, and it was noticed that the removal of the insect did not influence the spread of the disease in that particular summer.

(c) Mosquitoes (*Culecidae*).—They can safely be excluded from our present problem: for they are found only in the stable and not in the pasture.

(d) Sand-flies (*Simulium*).—This insect is very abundant in the pasture. The power of sucking blood is very strong; horses are, therefore, greatly annoyed by the sand-fly. This insect appears very early and stays until late autumn. Therefore there is a time when this insect monopolizes the pasture, all other insects disappearing. Choosing such a time of the year healthy horses and the patients were kept near each other in the same pasture, preventing, however, the intermingling of these two groups of animals. None of the healthy horses contracted the disease. In spite of the fact that the sand-flies attacked both the healthy and the sick animals for nearly a month, the disease was not transmitted. Hence we have reached the conclusion that the sand-flies have nothing to do with the process of infection.

(e) Stable-flies (*Stomoxys calcitrans*).—This is also a blood-sucking insect occurring as abundant and living as long as the sand-flies. It abounds in the stables of the plains. We, therefore, tried an experiment as early as 1908, letting the fly, which had sucked much blood from a patient, bite healthy horses; but the result was negative. During the season of the stable-fly the patients and the healthy horses were kept in two enclosures near each other. The result here was also negative. Next, many flies were kept in the wire-netting stable with the healthy and affected horses and allowed to bite the animals freely. Excepting a case of doubtful infection (experimental horse No. 472) among the healthy horses, the transmission of the disease was not so marked as in the mixed pasturing and in wooden enclosures. Hence the stable-flies cannot be taken as the true transmitters of the disease.

(f) Horse-flies (*Tabanidae*).—These are most abundant in the pastures and attack horses violently. In the stables they are scarce. It must especially be mentioned that the spread of the disease coincides in time with the appearance of this insect. Therefore at the outset of the experiments we caught many horse-flies and tried to let them bite healthy horses, but we soon dis-

covered it extremely difficult to keep them alive for any length of time. Moreover, we could not force them to suck blood out of the patients, though all the possible artificial means were tried. Not having been able to overcome these difficulties, we could not, to our regret, demonstrate experimentally that the horse-fly is an actual transmitter of the disease. But deducing from the fact that the infection takes place both in the mixed pasturing and in the wood enclosures at the period of the appearance of horse-flies, and that other blood-sucking insects are not likely to be the virus-transmitters, as was already described, we cannot escape from the conclusion that the infection of the disease is accomplished through the agency of the horse-fly.

Several species of horse-fly occur in the pasture where the foregoing experiments were performed. The time of appearance differs in different species.

Chrysopus japonicus WIED: The first part of May—the first part of June.

Hæmatopota tristis BIGOT: Latter part of May—the first part of July, again in the first part of September.

Several species of *Tabanus* (*T. chrysurus* LOEW, *T. trigonus* COQ., *T. trigeminus* COQ., *T. luridus* FALL., *T. rufidens* BIG., &c.): July, almost simultaneously, very abundant in August, disappear in October.

Inferring from the fact that in the pasturing experiments already mentioned the disease spreads both in May and June, when *Chrysopus japonicus* and *Hæmatopota tristis* appear, and in July and August, when several species of *Tabanus* develop, we can hardly avoid the conclusion that those horse-flies are the real transmitters of the infectious anæmia among horses in Japan.

(5) SYMPTOMATOLOGY.

General Symptoms.—The prominent features of the disease are irregular recurrences of fevers and progressive anæmia. At first the febrile attack comes suddenly and it subsides almost completely in a short time. This being repeated for several times the patient usually falls into anæmia and emaciation. During the progress of the disease, such symptoms as paleness of visible mucous membrane, cedema at various parts of the body, septicæmic phases and exhaustion appear. Of these the most marked feature of the disease is the disorder of the function of the heart.

General Conditions.—At the first stage of the disease the appetite of the animal is as good as usual, but the patient shows a dull and fatigued appearance. The movement of the limbs is somewhat interfered with. The patient usually slightly responds to whipping and sometimes does not react to the digital pressure at the loin. It is liable to be greatly fatigued with light exercises. As the illness progresses the patient becomes dull and likes to stand still at a dark place such as a corner of a stable, lowering its head. The power of attention is so weakened that the patient does not seem to have any inclination to get rid of flies, even if they swarm about it. With each febrile attack its emaciation and weakness gradually increase, and finally the patient falls to the typical case of pernicious anæmia. As the fatal termination approaches, the animal staggers, and lies down on its side, for its hind quarters do not have strength enough to keep it standing.

Bodily Temperature.—At the outset of the malady the temperature suddenly rises to 39° C. to 40° C., and after remaining so for a day or two (in some cases for many days) it falls to normal very rapidly. Frequency of the febrile attacks is variable. Of 274 cases, 116 had attacks two to nine times a month; in 93 it came after a month; and in 30 after two months. After three months the frequency of recurrence decreases, as is shown in the following six cases. The attack occurred once in one case, twice in three cases, and three times in two cases after more than six months. In one or two cases it came once after seven months. In chronic cases the animal keeps up for some time a subfebrile condition of 38° C. to 39° C.; sometimes such a case changes into an acute form with a sudden elevation of temperature higher than 39° C., or febrile attacks recur periodically for more than a year. Near the final termination the animal usually shows a collapse temperature lower than 36° C.

Visible Mucous Membrane.—The eye-lids and conjunctiva are, at the outset, of a dirty yellowish-red or yellowish-brown colour, slightly swollen, humid, showing a ramiform injection of the blood-vessels. After some time the mucous membrane is gradually discoloured and becomes yellowish-grey or pale or even whitish in the extreme cases; the swelling disappears. The tinge of other mucous membrane alters somewhat similar to that of the conjunctiva.

Petechiæ.—During the febrile attacks petechiæ appear in the conjunctiva, the mucous membrane of the nose, gingiva and other parts, and the mucosa of the rectum, &c. Usually they range from the size of a pin's head to a millet grain. Often, however, they aggregate themselves to form a hæmorrhagic area as large as a finger-ball.

Edema.—Edema usually appears at the belly, prepuce, lower portions of the limbs, face masseter region, lips, head, thorax, &c. Its extension varies proportionally with the condition of the malady. As in the case of petechial fever, the facial, laryngeal and tracheal regions are so much swollen that respiration and deglutition are interfered with. In rare cases œdema suddenly vanishes immediately prior to death.

Digestive Tract.—During the febrile attacks the patient's appetite is, more or less, impaired, as is usually the case with other febrile diseases, or is sometimes totally lacking. But no change is found in the digestive tract. Not infrequently a patient in an advanced case continues eating even when it can no longer stand on its feet.

The peristaltic action of the intestine is usually normal, but sometimes it is a little accelerated. The fæces are normal, but near the fatal termination they are softened or sometimes coated with a slimy mucus. By the time this stage is reached the anus is relaxed in many cases and temperature reading is thus rendered impossible.

Spleen.—The swelling of the spleen is a constant phenomenon during the febrile attacks, as can be detected by rectal examination. In chronic cases or inter-febrile periods the swelling varies in degree. In the cases of extreme anæmia the spleen is swollen very little or not at all.

(6) COURSE AND PROGNOSIS.

The disease can conveniently be divided into the acute, the subacute, and the chronic, but no sharp line of demarcation can be drawn between them. In the acute form high temperature remains for some time. After from a few days to two weeks from the beginning of the disease, the final termination comes always by the appearance of symptoms of septicæmia.

Those animals which pass through the first febrile attack may become better for a time, but a very small proportion of the

patients completely recover. In many cases another febrile exacerbation returns after two or three weeks, being accompanied by worse symptoms than the first. They then change into acute cases, and sometimes may remain for nearly a month. In chronic cases the disease continues from a few months to over a year, during which time the condition of the disease fluctuates with the recurrence of febrile attacks, or it changes into an acute type, and the final issue comes from anæmia and emaciation.

Prognosis of the disease is generally doubtful, and all the horses that contract the worst type of the disease are sure to die with the frequent recurrence of febrile attacks. Horses which have apparently recovered are liable to become ill again by certain insanitary conditions, especially by unfavourable climate or hard labour. Such patients usually die of another attack after a few months or in the following year. But in case the course of the disease is good, the patient acquires immunity and febrile fits come no longer. Not only do such patients look healthy (despite the fact that they are still the virus-carriers), but they can stand any ordinary labour.

(7) THERAPY.

In the first place, we made a series of experiments with a number of medicines that might possibly destroy the virus. However, none of them being found to be of any promise, we were obliged to be content, for the time being, with the hope of increasing the resistance of the patient against the disease. We experimented with all the available forms of therapeutics, taking the specific nature of the disease into consideration, that is, infectiousness, severe anæmia, recurrence of high fever, and the slow and prolonged course of the disease itself. The results were all unsatisfactory.

Care of the patient and allopathy:—

(1) Exercise, labour and exposure, *e.g.*, to extreme heat and cold, winds, snow and rain are apt to bring about exacerbation. The guard against these untoward conditions results in the abatement of febrile attacks and improves the course of the disease.

(2) Cardiacs, tonics, and digestives are effective to abate the symptoms.

(3) Nutritious and easily digestible food improves the con-

dition of the patient and consequently tend to increase the resistance of the constitution.

(8) IMMUNIZATION.

It has been observed that the animal that survived the disease no longer contracts it even if a large quantity of the virulent blood is inoculated. Thus a certain degree of immunity seems unquestionably to be acquired, but whether or no the serum of these immunized horses possesses any therapeutic or preventive properties must be decided by a systematic study. Accordingly, seven recovered horses were selected in which increasing inoculations were made with the following results:—

We injected 2 c.c. of the serum of an affected horse, which was gradually increased up to 2,000-4,000 c.c. with a pause of three to six days. Only three of the seven horses were made perfectly immune, while two died of infectious anæmia during the course of the treatment, and with the remaining two it was necessary to stop the treatment because of the swellings and hyperæsthesia at the site of inoculation.

(9) PREVENTIVE INOCULATION AND DISINFECTION.

From what has already been described, it is certain that the horse may be made immune against infectious anæmia, and we made a number of experiments to effect the preventive inoculation. The results of all these experiments, however, turned out to be negative.

DEPARTMENTAL ORDINANCES.

Draft of Regulations for the Prevention of Infectious Anæmia among Horses.

Art. 1.—The pasturing district that is brought under the control of the Regulations for the Prevention of Infectious Anæmia shall be called “prevention district.”

Art. 2.—Local governors shall determine the prevention districts, and give notice thereof throughout the districts under their respective jurisdictions, and shall report thereon to the Minister of Agriculture and Commerce and inform the local governors of the neighbouring prefectures thereof.

Art. 3.—Police officers, mayors, town headmen and village headmen shall report cases of infectious anæmia to the local

governors, when they receive reports from the owners of the diseased animals.

NOTE.—In the city of Tokyo, Kyoto, Osaka and Nagoya the urban district headmen shall perform the duty imposed upon the town headmen or village headmen. This will be the same throughout the regulations.

Art. 4.—Horse-owners or those who have the charge of horses shall immediately report the death and slaughter of horses affected with infectious anæmia to police officers, mayors, town headmen or village headmen.

Police officers, mayors, town headmen or village headmen, who receive such support shall report to the local governor.

Art. 5.—The police officers, mayors, town headmen or village headmen in the same prevention districts shall inform with one another the fact that they have received such reports according to Arts. 3 and 4.

Art. 6.—When there are indications of the spread of infectious anæmia among horses in any prefecture, the local governor shall give notice of the provisions under Arts. 3 and 4 throughout the district under his jurisdiction and at the same time give a report thereof to both the Minister of Agriculture and Commerce and to the local governors of the neighbouring prefectures.

Art. 7.—Local governors shall station inspectors at several places in the prevention district and make them carry out physical examinations on all the horses.

They shall appoint these inspectors from officers belonging to them, city, town, and village officials and veterinarians.

Art. 8.—Physical examinations shall be carried on at least once a week during the epizootic season and once a month during the rest of the year.

Local governors may increase or decrease the number of inspectors according to the condition of the outbreak.

Art. 9.—Police officers, mayors, town headmen and village headmen who have received reports or found out by inquiry a case of infectious anæmia, shall immediately inform the inspectors thereof, who shall make examination at the place of occurrence.

Art. 10.—In case inspectors find out patients or suspicious cases, they shall make the horse owners, or those who have charge of the horses, isolate the patients, or kill them if necessary.

Art. 11.—If the affected horses that were isolated according to Art. 10 recover, the exercise test shall carefully be performed with them. If perfectly normal, they may be set free.

Art. 12.—In case there are indications of the epizootic within the prevention district, the local governor may prohibit the removal of horses in a certain region or the introduction of affected horses or suspicious cases.

Local governors shall give notification throughout the district under their jurisdiction, report to the Minister of Agriculture and Commerce, and inform local governors of the neighbouring prefectures about the district set apart according to Art. 12.

Art. 13.—Local governors shall investigate the conditions of the outbreak of infectious anæmia and shall report the results once a month to the Minister of Agriculture and Commerce according to the accompanying form (the form is omitted).

Art. 14.—Local governors shall notify the people throughout the district under their jurisdiction, report to the Minister of Agriculture and Commerce, and inform local governors of the neighbouring prefectures of the discontinuance of the enforcement of Arts. 2 and 12.

DEATH OF SIR W. GILBEY.

A LIFE full of accomplishment has ended by the death of Sir Walter Gilbey at the age of 83. From a subordinate in an estate agent's office and a clerk in the Army Pay Department in the Crimea, he rose to be the head of a great wine and spirit business and a unique authority on horse matters. He founded the Old English Cart Horse Society in 1877. He was one of the leading spirits in the formation of the Hackney Horse Society. He initiated the movement that led to the formation of the Royal Commission on Horse Breeding. He established the Whit Monday Cart Horse Parade in 1886. The late King Edward in 1891 attended at a meeting held in his honour and presented him with his portrait by Orchardson. He was granted a title in 1893. No man has done more for stockbreeding than Sir Walter; few men have written more about horse-breeding and no man was more capable of giving sound advice on the subject. His life is a record of useful work well done, and agriculture and horse-breeding lose a true friend by his death. He was of a cheery and genial disposition and ever ready to help and encourage those working in the same fields as himself. He is succeeded by Henry Walter Gilbey, born in 1859.

Clinical Articles.

STRANGULATED SCROTAL HERNIA.

By F. MORTON WALLIS, M.R.C.V.S.

Hulstead, Essex.

SOME time since I received an urgent call to attend a yearling cart colt which was described as badly "griped." On arrival I found the animal sweating profusely, and showing all the usual symptoms of great pain. On examination I found strangulated scrotal hernia the evident cause. The scrotum was full and hard, and on passing my hand into the rectum I could feel the continuance of the bowel descending into the scrotum also full and tense. The case being very serious and urgent, I at once adopted a line of treatment *which has yielded me success before*. I injected hypodermically 1 gr. each of physostigmin salicylate and pilocarpine hydrochloride. On release the colt at once lay down, turned on its back, which I took advantage of to secure his legs and keep him in that position for about three-quarters of an hour, with a bag of chaff either side to assist.

Having emptied the bowel as far as possible on first examination, in about twenty minutes after the injection I passed one hand up the rectum and placed the other on the scrotum, and by gentle manipulation, aided by the action of drugs named above (and without which, in my opinion, my manipulations would have been absolutely useless), I had the parts reduced and the colt up under the hour.

An anodyne draught, quiet and careful feeding completed the cure, and three weeks after I castrated him by the usual covered operation, and he is now a well-grown and promising colt.

I do not claim that there is anything unique in my treatment, as, of course, others may have done the same, but I have never heard of its adoption, and knowing how many veterinary surgeons fear to use these drugs in much less complicated cases, "I hae ma doots." I am satisfied that the want of confidence in and fear of these drugs is mainly caused by their not being adopted early enough in the cases. After large use of these drugs for many years now, I can honestly say I have never had the least reason to suspect them as being the cause of any untoward

circumstances in any cases I may have lost where they have been used.

They are invaluable in the *earliest* stages of impaction of the bowel—impaction with tympany (here assisted by puncture of bowel)—and cases of choking. I never give more than $1\frac{1}{2}$ gr. of each, and not often under 1 gr., but am most particular to buy only the best drugs.

One great advantage is that in some rare cases where you do not get the desired result, you can always follow on with a full dose of aloes without any fear whatever of the result.

INTESTINAL OAT-HAIR DUNG-BALL CALCULUS IN A MARE.

By HENRY B. EVE, M.R.C.V.S.

Folkestone.

Subject.—A heavy vanner, the property of the South Eastern and Chatham Railway Company, Hythe.

History.—The animal concerned had only been doing its usual work, and appeared all right over-night when fed, and did its usual round next morning, when carman noticed it amiss, and brought it home, and I was 'phoned to attend on October 19.

Symptoms.—On arrival I found the mare showing symptoms of engorgement of the stomach, with gastric tympany, intermittent colicky pains, pawing with fore-feet, countenance haggard, eye distressed, back arched, belly distended, respiration hurried. The animal frequently had a tendency to rest its hind quarters against the side of the stall, and bowels were severely constipated, and habitually so. When removed to a loose-box mare stuck its nose in a corner for a time, and frequently backed into a corner, indicating (stoppage of the bowels) double colon impaction, and at times sat on its haunches like a dog and raised itself from the ground like a cow with milk fever endeavouring to get up, which position appeared to give relief for a time. Accelerated pulse and temperature elevated. Straining as if wanting to stale continually.

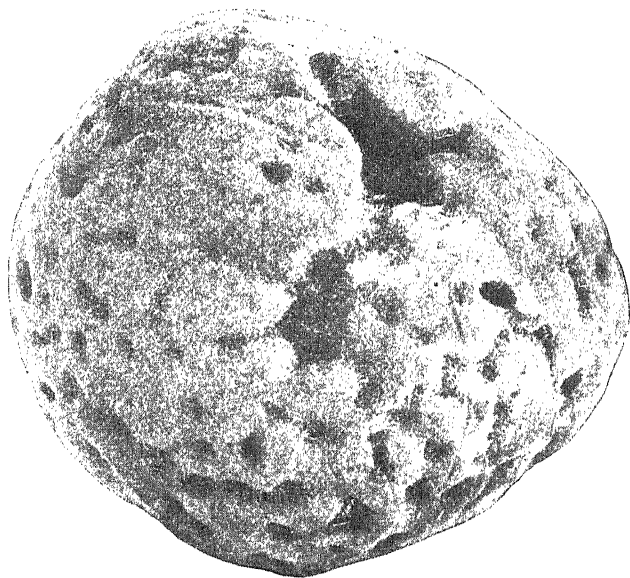
Diagnosis.—Intestinal obstruction, probably a twist or calculus.

Prognosis.—Unfavourable.

Treatment.—Gave an oleaginous purgative and sedative

draught, and adopted usual treatment, had animal walked about. (Noon) internally applied counter-irritant to abdomen. Administered morphia and atropine, hypo. (6 p.m.) revisited, gave hypo., eserine and pilocarpine and stimulants. (11 p.m.) hypo. strychnine, no result.

Next day gave arecoline, but with no satisfactory effect, only produced salivation, and no fæces were passed, but hastened death, which occurred on the 21st.



Oat-hair Concretion (Dung-ball).

Remarks.—As anticipated, the mare died, and, unfortunately, I was unable to be present at *post-mortem*, but the knacker man kindly informed me that the “guts” were twisted, and in addition that they found a huge dung-ball calculus, which he kindly sent by carrier for me to see. It was about the size of a large coconut and weighed 3 lb. 15 oz. (see illustration).

P.S.—This is the second case I have encountered recently of impaction due to the same cause. The first one I came across when meeting Mr. W. W. Gulleford, M.R.C.V.S., Lympne, Hythe, in consultation. He made the *post-mortem* and verified diagnosis, which defied all treatment.

TWO CASES OF TETANUS TREATED WITH ANTI-TETANIC SERUM (PARKE, DAVIS & CO.).

By W. WATERS, M.R.C.V.S.

Blofield, near Norwich.

CASE I.

Subject.—A six-year-old gelding, the property of a small coal merchant.

History and Treatment.—On June 24, 1913, the said horse was led to my premises (a distance of four miles) for me to see owing to his being stiff and unable to eat. Upon examination I found I had a typical case of tetanus to deal with, the seat of entry for the bacilli being a large artery on his sheath. I sent the horse off home again at once and had him put into a darkened, roomy box and kept quiet.

I managed with difficulty to give him a physic ball, then cauterized the artery on its raw places, and finally gave him a dose of anti-tetanic serum. On the third and sixth day further doses of serum were given. From the third day of treatment the patient progressed steadily, making an uneventful recovery, and going back to work again in three weeks.

CASE II.

Subject.—A valuable six-year-old cart mare, the property of a farmer.

History and Treatment.—I was sent for to see this mare on January 23, 1914. I found that she had suffered from a pricked foot three weeks previously, which had been attended to by the blacksmith.

Two days before I saw her she was noticed to be getting very stiff all over and disinclined to feed, so owner sent her to work, only to find that the more exercise she had the worse she became.

Upon examination there was no difficulty in diagnosing a very severe attack of tetanus, the jaws being locked so much that it was quite impossible to get one's hand into her mouth. Also, when we tried to move her into a more roomy and isolated box, we had the greatest of difficulty to keep her from falling down. A dose of serum was administered at once, and as case was very far advanced the dose was repeated on the second, fourth, sixth, and eighth day. She was just able to sip water

and very sloppy mashies, so salines were given by this means to take the place of a dose of physic.

Progress after the first few days was slow but steady, and she made a perfect recovery in three weeks from date of first visit.

Remarks.—As these are the only two cases which I have treated by the serum method I do not expect to be always so successful, but I think it is always worth a trial, provided that the animal is of sufficient value to pay for the expense.

FRACTURE OF THE SPINAL COLUMN IN A HORSE WHILE RESISTING AN OPERATION.

By M. ELOIRE,

Of the Alforts Veterinary School in France.

A GOOD-SIZED pony, about 6 or 7 years old, of a very nervous temperament, was with difficulty placed under restraint preparatory to a dental operation.

The animal struggled and started, in spite of a chain round its neck, a lever to prevent backing extended from the longitudinal bars of the apparatus, and a "twitch" on the upper lip, which was held up by an assistant.

The right-hand molars having been fairly well levelled and rasped down the left side was about to be begun when the animal fixed his hind legs and gathered himself up for a great effort, pulling violently from the collar-bone against the neck chain.

Situated as I was at the pony's head, I took the effort that he made to be an expulsive action of the rectum, and fearing an inversion of that organ I had the restraining head and tail ropes unfastened.

The animal collapsed on to its haunches with its head hanging over an iron crossbar situated between the two front uprights of the apparatus.

On being extricated the animal remained on the ground in the position of a squatting dog. It finally fell over on its flank in a futile attempt to recover its feet. This proved to be a physical impossibility. Fruitless exertions caused the tail to be carried horizontally and to be jerked up and down by little convulsive contractions.

With the help of bars passed underneath we endeavoured to

lift the animal on to its feet, but while the front feet could be maintained in a standing position, the hind quarters remained inert with crossed legs tailor-fashion. There was no doubt about what had happened—in an instant, under our very eyes the vertebral column had been dislocated in the frantic muscular effort made by the animal to free himself from constraint. This had occurred at the moment that it had gathered itself up into the curved, buck-jumping attitude.

The horse was slaughtered for food. On examination the spinal cord was found to be crushed into the medullary channel.

This kind of accident, which has been observed from time to time in the case of a cast animal, has been attributed by practitioners to the efforts made by the animal at the moment of its fall upon the ground and not to the animal's contractions in endeavouring to free itself while being cast.

The present case is perhaps unique, being the rupture of the vertebral column in a standing horse where there had been no fall; therefore the accident which we had witnessed was obviously due to excessive muscular contraction alone.

This experience teaches us that a horse while struggling under any sort of operation—whether the animal be standing or cast—should, above all, be prevented from assuming the curved position which has been described above. Such prevention can be effected in the case of a standing horse by keeping the head very high up, and in the case of a cast horse by pressing the head back on the neck as far as possible. In doing this the practitioner's assistant should place his hand under the animal's lower jaws and actually lift the head, instead of depending on the drawing-up action of halter or bridle.

AN UNUSUAL SKIN ERUPTION AFFECTING THE UDDER.

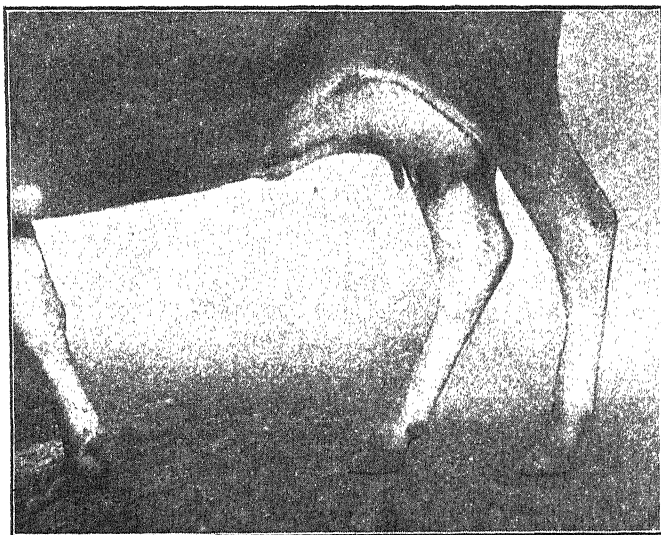
By HENRY TAYLOR, F.R.C.V.S.

Haywards Heath.

THE accompanying photograph illustrates a very curious eruption on the skin of the udder, a condition which I have not met with before. The most common skin eruptions in this region are cowpox, a pustular affection in which small pustules about the size of a lentil form, the skin destruction not extending deeper than the stratum

lucidum ; and, lastly, a carbuncular eruption, which finally results in the formation of punched-out holes in the skin extending down to the subcutaneous tissue. The affection in question was quite different from either of the above.

The animal was a young Jersey cow which had recently calved, aged 3 years. The lesions on the skin consisted of numbers of reddish-brown scabs, in circumference about the size of a threepenny bit, but raised above the surrounding skin to a height of about $\frac{1}{4}$ in. The scabs were found both on the teats and on the udder itself, and there was apparently no difference in the size and shape in



Erupt'on on the Udder and Teats.

either case. The scabs could be fairly easily removed from their attachments, leaving in such an event a red excoriated base which did not seem to extend to any depth into the skin. The affection seemed to begin as a reddish papular eruption as far as one could judge, the apex of the papule quickly changing into the above-mentioned scabs. There was a good deal of itching, but not much soreness, the animal frequently licking the udder to allay the itching. This resulted in the disease being transferred to the nose, but here no scabs formed, the chief noticeable lesions being light-coloured areas about the circumference of the scabs on a dark-coloured background.

The treatment consisted in washing the udder with antiseptic

lotions followed by the application of an ointment containing boracic acid and eucalyptus, and in a short time the places left by the detached scabs soon healed, and as no fresh crops appeared the cure was soon complete.

The spots are rather obscure in the photo.

[An aphthous-like disease of cattle has been noticed on the Continent, where yellowish-red nodules appear on the muzzle and exceptionally on the nasal mucosa, and at the same time nodules the size of a lentil with several vesicles and subsequent crust formation appear on the udder and teats.—G. M.]

Feline Clinical.

PARALYSIS IN A CAT—RESULT OF FALLING FROM A GREAT HEIGHT.

By F. C. MAHON, M.R.C.V.S.

Chiswick, W.

In a long and varied experience now close upon thirty years, among both the canine and feline species, I have encountered a few remarkable cases, none of which, however, can be placed in the same category as the one I am about to relate.

Breed, Siamese cat, age about 18 months. Last January she fell inadvertently from a window whose height from the ground was approximately 70 ft. Beyond a few minor injuries to the mouth, no particular feature bordering on fracture of any portion of the appendicular skeleton, or displacement of the vertebral column, was discoverable. Concussion of the brain and spinal cord were marked, the patient lying inert for about three days, when she recovered all natural movements, regained her usual appetite, comported herself in a natural manner in all ways. She gave birth some few months ago, and the act of parturition was accomplished in a perfectly easy manner.

Whilst at play with one of her kittens, she was seen to disappear into space, and was picked up from the concreted area surrounding the flat. I saw her within an hour of the occurrence, and after a careful examination was sceptical as to her ultimate recovery. Being a prize-winner, and above all a gentle patient, I persevered with treatment. The upper lip being injured, and several incisor teeth of the upper jaw forcibly broken away, I

disinfected the mouth with a weak solution of chinisol, followed by adrenalin 1 in 1,000. I detected no fracture, found no hæmorrhage from the bowels or vagina, detected no pain of any distinctive character, more marked in one region than another, but found the hind quarters devoid of use, and insensitive from the lumbar region posteriorly to tip of tail insensitive to pin-pricking.

Locally *pro tem*. I used belladonna liniment along the spine, warm water flannel compresses, and at intervals directed a few drops of mustard oil to be gently rubbed along the spine. Gave 5 minim doses of "Glonoin" (homœopathic) with an eggspoonful of brandy every two hours. This treatment I continued for several days. Bovril, beaten egg, with a few drops of brandy, were given on the second and successive days, up to the ninth following the accident.

Contemporary with this treatment I gave glycerine injections twice daily. . Meanwhile as prostration persisted I prescribed enules of meat. On the twelfth day ordinary appetite returned, with slight use of the right hind leg, especially from the hock upwards. That of the left hind leg remained absent up to the sixteenth day, when the patient commenced to use it slightly.

From this date I daily applied, after massage, friction of loins, quarters, and along spine a weak ointment of capsicum. My patient is, on the twentieth day after the fall, able to move about in comfort, although there is a slight appreciable dragging of the left leg, and the toe of left foot occasionally is bent backwards.

On the eighth and up to the fifteenth day superseding the fall, I gave intramuscular injections of strychnia (5 minims) daily, and certainly with good results. From the fifteenth to twenty-second I withheld same.

I consider the case unique in many respects.

Should I unfortunately encounter any cases of similar character, I shall try hemisine-episine-adrenalin, the active principle of the suprarenal gland—its action on the circulatory system is to cause acceleration of the heart-beat, and powerful constriction of the smaller arteries. I pin great faith to this agent, which I have used under different names, according to the firm who supply it.

Reviews.

Meat and Food Inspectors' Examinations. Model Answers to Questions set by the Royal Sanitary Institute and other Examining Bodies. Compiled by G. T. Billing, Meat Inspector, Metropolitan Borough of Finsbury, and A. H. Walker, Sanitary Inspector, Metropolitan Borough of St. Pancras. Second Edition. Pp. xii + 180. The Sanitary Publishing Company, Ltd., 55-56, Chancery Lane, W.C. 1914.

This work is intended as a guide for candidates presenting themselves for the Meat and Food Inspectors' Examinations held by the Royal Sanitary Institute. There are 165 model answers to questions on many and varied subjects that have been set at examinations held at one time or the other. It is a useful book of its class, and as far as stock questions and answers on any given subject can indicate a candidate's knowledge, no doubt it will be helpful to students, and possibly also to some examiners.

We note that the question as to the sanitary arrangements of a cowshed dates back to 1909. We fancy some more recent data might be given in the year 1914 as answers to this question. The allocation of suitable floor space for cows is in our opinion perhaps the most important matter in connection with cowshed sanitation nowadays.

Specimens of *viva voce* questions and answers are included in the little volume, and at the end, in the Appendices, there is given a summary of butchers' joints, their composition and approximate weight, and plans of the sides of carcasses with the various cuts marked out.

The book may be described as a very useful one for veterinary surgeons, in which desirable knowledge in many points of meat and food inspection is given in condensed form. As a handbook for candidates for the R.S.I. certificates it is almost indispensable. It is well bound and well printed.

G. M.

Parasites et Maladies parasitaires du Chien et du Chat. By L. G. Neumann, Professeur à l'Ecole Nationale Vétérinaire de Toulouse. 15 figs. in the text. Publishers, Asselin and Houzeau, Place de l'Ecole-de-Médecine, Paris. 1914.

The great number of animal or vegetable species that can instal themselves in the organism of the dog, and frequently affect the cat, renders a book solely devoted to parasitism as it concerns them particularly appropriate and acceptable. The author in 340 pages of letterpress has pretty well put everything of importance that is known in France and foreign countries of this special domain before his readers. He has not neglected to dwell on that aspect of the subject which deals with the conveyance of canine and feline parasitism to human beings and herbivora. Inasmuch as there are apparently still men who pose as judges and assert that sarcoptic mange of the dog is not

communicable to man, it is interesting to note that Monsieur Neumann quotes about a dozen authorities who have seen many cases of human mange caught from the dog, and the writer, having suffered himself from the complaint, knows that the communication of the malady from the dog to man is quite possible. The fact that sarcoptic mange can also be transmitted from the dog to the horse should not be lost sight of. The book deals fully with both internal and external parasites. The little volume should be very useful to veterinary surgeons, naturalists, and dog and cat breeders. A few pages at the end of the book are devoted to the parasites of that useful domesticated variety of the polecat called the ferret. We can heartily commend the book to those who wish to specialize in the diagnosis and treatment of parasitism. An English translation of it would doubtless circulate well in this country. We note that the author has also produced a little work in French on "The Parasites and Parasitic Maladies of Domestic Birds." Few books on the Diseases of Birds exist, and any branching out in this field of science indicates desirable progress.

G. M.

SPECIAL NOTICE.

We shall shortly publish a Special War Number of particular and permanent interest to the Veterinary Profession. The Editor will be glad to receive, both from Army Veterinary Officers and from Civil Officers attached to the Army Veterinary Service, contributions dealing with the work being done by our profession in connection with the British Expeditionary Force.

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